A STUDY OF HYDRO-ELECTRIC AND FORESTRY DEVELOPMENTS IN THE HIGHLANDS WITH REFERENCE TO THE BEAULY BASIN, TUMMEL BASIN AND MID-ARGYLL, WITH A VIEW TOWARDS ASSESSING ANY CONSEQUENT ECONOMIC AND DEMOGRAPHIC CHANGES.

by

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S E C T I O N II

HYDRO-ELECTRICITY AND FORESTRY - A REGIONAL ECONOMIC AND SOCIAL STUDY

PART 2 THE TUMMEL BASIN

CHAPTER 9

HYDRO-ELECTRICITY

A. THE SCHEME - A DESCRIPTION

The essentially stepped character of the long profile of the Tummel Valley immediately suggests its suitability for hydro-electric development. The fact that the overall drop of about 600 ft. in the 30 miles between Loch Laidon on Rannoch Moor (925 ft. O.D.) and the Tummel-Garry confluence (300 ft. O.D.) is concentrated on the edges of three steps and that each step is occupied by an over-deepened loch, suggests the practicability of attaining an adequate "head" of water at these points and stor-:ing water in each of the lochs.[a]

The feasibility of harnessing the waters of the Tummel and its tributaries was recognised by the Grampian Company at an early stage, and the hydro-electric works in the area, first begun by that Company, have been continued by the Board. Today, the Tummel and its tributaries are harnessed in six main hydro-electric power stations[b] with a total installed capacity of 240,000 kW., which is estimated to produce an average of 600 million units per year. The Board's works in the basin are not yet complete for further small schemes which are as yet under survey or under construc-:tion, are calculated to increase this output to about 660 million units, the great-:est concentration of hydro-electric power to be produced from any single river system in Scotland, with the great inherent advantage that geographically it is in the centre of Scotland.

Two of the six stations were built pre-war by the Grampian Company. With rather limited funds together with the fact that they were carrying out their con-:struction schemes in the midst of an economic depression, it was desirable that the Company should develop first what were probably the greatest and most easily developed "heads" of water. Lying some 480 ft. in the hills above the main valley at Loch Rannoch is Loch Ericht, one of the largest lochs in the Highlands. Here in 1928, the first of the Grampian Company's schemes was begun which incorporated

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[a] Fig.46.

[b] Gaur, Rannoch, Tummel, Errochty, Clunie and Pitlochry Power Stations.

the building of a dam to increase storage and "head" and a $2\frac{1}{2}$ mile long aqueduct to carry the water to a power station[109] on the shores of Loch Rannoch near where the River Ericht debouches into the latter. This power station, which came into operation in 1930, has a capacity of 48,000 kW., operates on a total "head" of 512 ft., and has an annual output of 171 million units of electricity. Between 1928 and in stages until 1942, the Grampian Company through a series of dams, weirs and tunnels, tapped the head waters of both the Spey and the Garry and diverted the water into Loch Ericht, thus increasing the catchment basin of the Rannoch station to 177 sq. miles.

The second of the Grampian Company's schemes was the utilisation of that stretch of the river which flows between Lochs Rannoch and Tummel. Loch Rannoch itself was not affected, merely controlled by a weir permitting an 8 ft. range of loch level (Loch Ericht has a range of 30 ft.) Below the alluvial flats known as Bunrannoch, the river enters a gorge and drops about 170 ft. in all before Tummel Bridge is reached. At the head of the gorge a small dam was built, the resulting reservoir, known as Dunalastair, flooding about one-half of the haugh lands of Bunrannoch.[146] This reservoir acts as a sort of compensation reservoir whose purpose is to control the daily load fluctuations at the Tummel Bridge power station. An open contour aqueduct,[113] some $2\frac{3}{4}$ miles long and 50 ft. wide, carries water from the dam to a point, 640 ft. O.D., immediately above the generating station at Tummel Bridge[110,111] by the south bank of the River Tummel. The Board have recently[a] enlarged the aqueduct so as to increase output at Tummel Bridge. Here, two massive pipes, each 650 ft. long and $2\frac{1}{2}$ ft. in diameter, lead water down the steep incline to the power house. Generating plant of 34,000 kW. capacity is installed at this station. At Tummel Bridge is the main control point and switching station for the whole scheme.[107] Below the power station the water is returned to its normal course down the River Tummel. The Dunalastair-Tummel Bridge section was completed by the Grampian Com-:pany between 1930 and 1933. These works, together with the Ericht-Rannoch scheme constituted the major generating plant of the Company and utilised over 200 square

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[a] 1960

miles of catchment area much of which, owing to its elevation, carries an appreciable snow cover for about four months of the year.

All the other power stations on the Tummel were constructed as part of the Board's post-war Tummel-Garry scheme. The first part of this scheme led to much bitter controversy, for it entailed the construction of two large dams and power stations amid areas of great scenic beauty. More will be said about this later. A large dam was constructed in the lower gorge of the Tummel, greatly enlarging the loch of that name through raising its level by 17 ft., and making use of the third and last step of the river profile through the construction of a power station near the Tummel-Garry confluence, some two miles downstream by tunnel. At this point water is discharged into an artificially created reservoir, the new Loch Faskally, formed by a dam across the river at Pitlochry. The Pitlochry power station is an integral part of the dam.[77] This dam was constructed to even out, as far as possible, any irregularities in river flow caused by uneven discharge from power stations further upstream. The Clunie station (61,000 kW.) and the Pitlochry station (15,000 kW.) together have an annual output of about 219 million units per annum. This part of the scheme was completed in 1950.

The second part of this project was concerned with the construction of a huge dam[85] in Glen Errochty lying immediately north of the Tummel Valley. Above Trina-:four, the River Errochty meanders across a wide flat floored valley some three miles long, which is constricted at its eastern end by a narrow gorge where the river has cut down through a band of resistant quartzite. Here exists a natural step like those in the long profile of the Tummel, an excellent site for a dam and reservoir. But what of water supply? The flow of the River Errochty alone was insufficient to meet the Board's needs. This difficulty was got over by leading water from the River Garry and its tributaries by an intricate system of tunnels, altogether twelve miles long, through the hills into the new Loch Errochty. From this loch, the level of which when full is 1,080 ft. O.D., a six mile long tunnel leads water south through the hills to a power station situated in the Tummel Valley, about one mile east of Tummel Bridge and near the western end of the

enlarged Loch Tummel. The Errochty power station has an installed capacity of 75,000 kW., operating on a "head" of 610 ft., and an annual output of 103 million units of electricity per annum.

Compensation water from the Errochty Dam operates a small power station re-:cently opened near Trinafour.[91] This compensation water is of sufficient volume to maintain a considerable flow of water in the River Errochty, part of an experi-:ment being carried out by the Board to try and induce salmon to use the Errochty as a spawning bed in place of the now largely dry Garry.

This phase in water power development incorporating the integration of river systems and the extension of catchment basins through the diversion of water in aqueducts and tunnels from one river basin to another, may be put into practice once the natural sequence of drainage, also known as the "natural water path se-:quence" to engineers, has been fully utilised. The Errochty scheme incorporates an interesting example of this whereby some 67 square miles of Garry drainage, brought about through the beheading of the Bruar, the Allt a' Chreachain, the Edendon, the Allt Culaobh and the Garry itself about a mile above Edendon bridge, and diverting the water through tunnels and aqueducts into Loch Errochty, makes possible the generation of electricity at Errochty power station on Tummelside. The reason for this large scale water diversion may be attributed largely to the unfavourably long and relatively even profile of the River Garry for the siting of dams and power stations. Only at the Pass of Killiecrankie and the Vale of Atholl is there anything remotely resembling the step and gorge profile of the Tummel Valley but here more pressing forms of land use such as agriculture and settlement (Blair Atholl), rule out hydro development. Only the Tilt among the major tribu-:taries remains unaffected by the scheme.

On a smaller scale, as already mentioned, a number of tributaries of the Spey, the headwaters of the Rivers Tromie and Truim, are beheaded and their waters divert-:ed by aqueducts and tunnels into Loch Ericht near Dalwhinnie. In 1959, the Board added to these works by incorporating a station, known as the Cuaich Station, with a capacity of 2,400 kW. and an annual output of 9.3 million units, into this system

to make use of the water which had previously flowed unhindered through the aque-:ducts into Loch Ericht. The Garry headwaters are tapped at Loch Garry itself by a tunnel leading through the hills to Loch Ericht. This tunnel was constructed by the Grampian Company. Certain modifications are at present[a] being carried out here by the Board. When finished the scheme will incorporate an underground power station by the shores of Loch Ericht, about one mile from Coire Bhachdaidh Lodge, to utilise the 180 ft. difference in level between the two lochs. This station will have a capacity of 2,200 kW. and an estimated output of 11 million units.

There is little doubt that these schemes have considerably added to the hydro potential of the Tummel Basin. However, it should be borne in mind that such diversions greatly add to the capital cost of installation and thus to the cost to the consumer.

Contemporaneously with the Errochty Scheme, the Board went ahead with the construction of a small dam[124] in the Gaur gorge below Loch Eigheach. Here a fully automatic power station - the first such station to be opened by the Board - came into operation in 1953, with an installed capacity of 6,400 kW. and an annual out-:put of 17 million units. At the moment the Board have under survey a further scheme to utilise the drainage of that womb of waters - Rannoch Moor - at Loch Laidon. Here it is hoped to build a scheme which, if carried through, will utilise the "head" between Lochs Laidon and Eigheach and will produce a further 16 million units of electricity. In addition this scheme will do much to control the flood waters which flow down the River Gaur to the Tummel Valley and thereby lead to the more efficient running of all the hydro stations in the basin.

Of the major stations, Gaur is automatic and Rannoch manually operated while Tummel Bridge and Errochty are push-button stations, started, synchronised and stopped from the Group Control Centre. Pitlochry Power Station is operated and controlled from Clunie.

Near Tummel Bridge is the main switching station, known as the Errochty Switching Station, for the whole Tummel Valley Group of stations and from which

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[a] This work was recently completed, August 1962.

a number of 132 kV. lines radiate.[a]

At Port-na-Craig House by the shores of Loch Faskally is the operational control centre for the whole of the Board's area - the North of Scotland District. Here the outputs of all the Board's stations - hydro, steam and diesel - are con-:trolled and co-ordinated. For a time the Board used Port-na-Craig and Faskally Houses as training centres but this combined plan has since been departed from. During that time the Board's "brains" centre was temporarily located at the Errochty Switching Station. Today Faskally House is a Forestry Commission training school.

Bearing in mind the high regard with which the Tummel is held as a salmon river in angling circles, the Board have taken care, in consultation with fishery interests, to construct fish passes to allow spawning fish, salmon and sea trout, to by-pass the dams on their way to and from the spawning grounds. There are salmon passes at Pitlochry, Clunie, Dunalastair, and Gaur dams. In addition, the Board discharge compensation water which is boosted in volume during the spring and autumn salmon runs so as to help meet the needs of ascending fish. Much more de-:tail will be given about this later when the effects of the Board's schemes on fisheries in the basin will be assessed.

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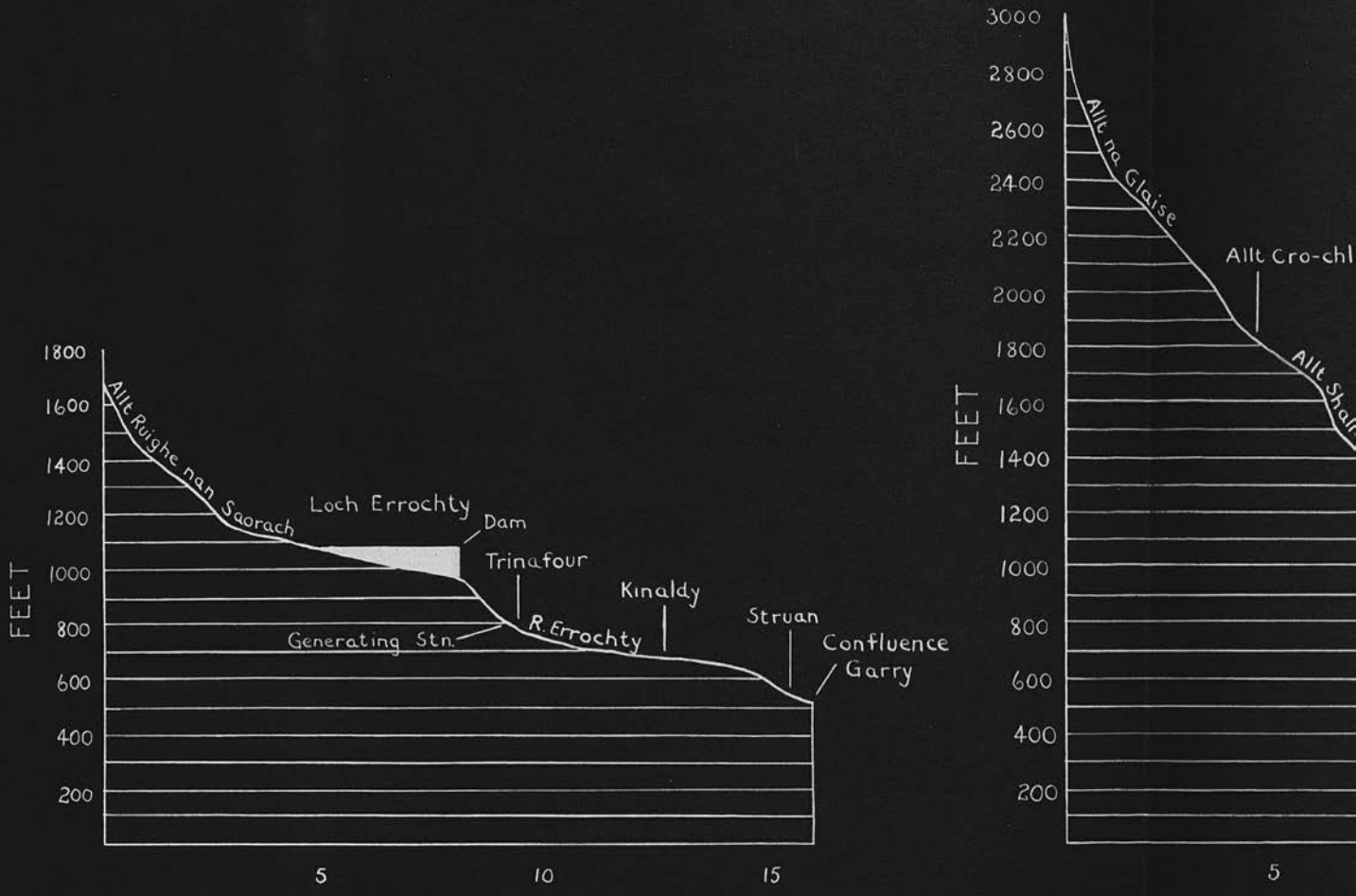

RIVER ERROCHTY

FIG. 46A RIVER PROFILES IN RELATION T

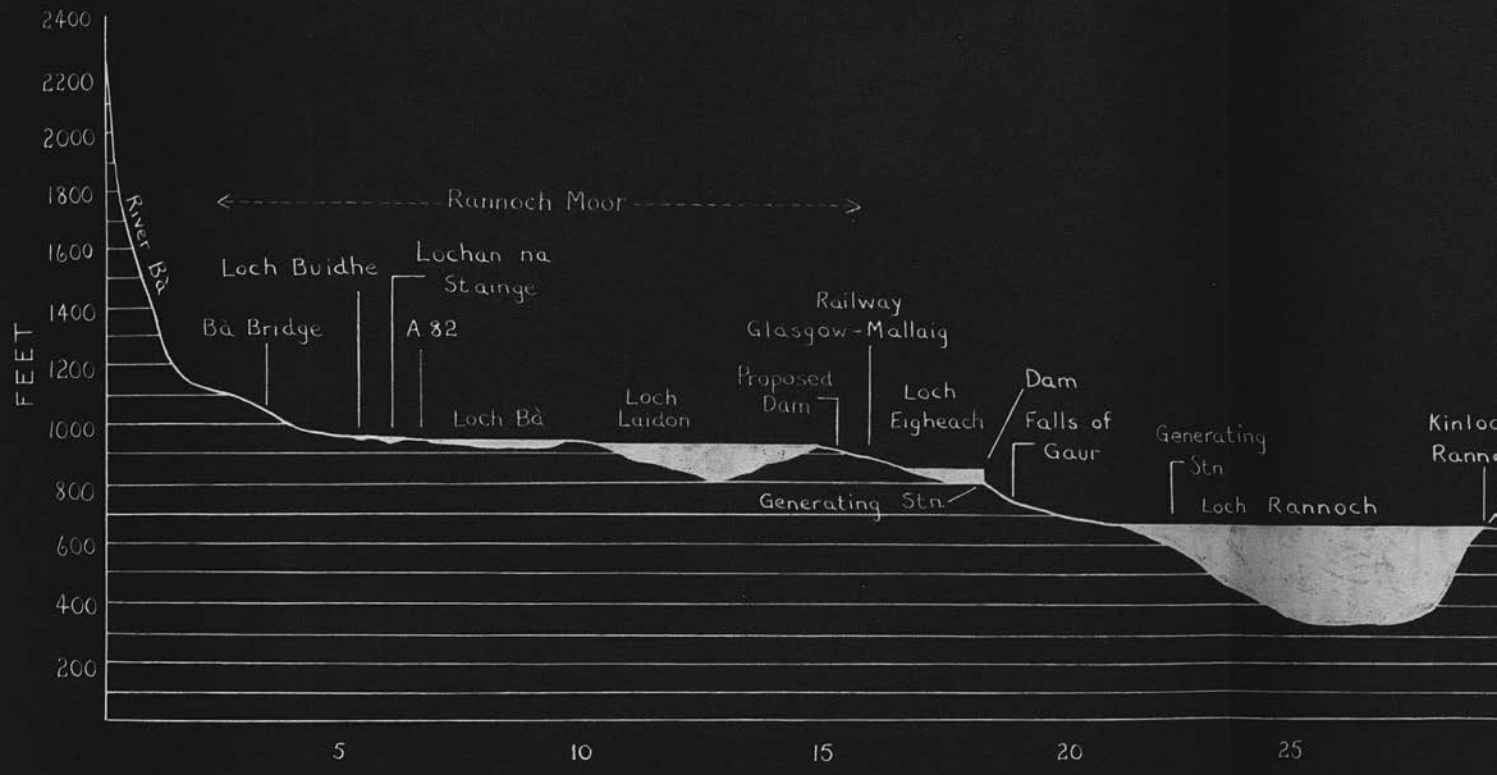

FIG. 46B RIVER PROFILE IN RELATION TO


FIG. 47 TUMMEL BASIN
TUMMEL VALLEY HYDRO-ELECTRIC SCHEME
Dam
Loch Cuaich
Dam
Allt a' Bhrean
Loch an t-Seilich
CUAICH
DALWHINNIE
Loch Bhrodain
Allt Gharbh Gy
Loch an Duin
R Truim
Edendon Water
Tarf Water
Allt a' Ghamhna
Loch Loch
Allt Mhaire
R Tilt
ERICHT
Loch Garry
Loch Erricht
Allt a' Chreadh Dhuin
Bruar Water
Banvie Burn
Allt Shallainn
Loch Errochty
Dam
TRINAFOUR
STRUAN
BLAIR ATHOLL
Allt Girnaig
R Garry
R Errochty
Allt Eighrach
Dam
R Errich
ERROCHTY
Loch Tummel
Dam
Loch Faskally
PITLOCHRY Dam
KINLOCH RANNOCH
Weir
R Tummel
CLUNIE
RANNOCH
Loch Rannoch
Dam
TUMMEL BRIDGE
PITLOCHRY
Dunalastair Reservoir
Allt Kynachan
GAUR
Garbh Ghair
Dam
Loch Laidon
Allt Dubh
Allt Breithe
Allt Coumhann
Dall Burn
Allt na Bogair
Errochaidan Burn
R Tay
Loch Ba
R Ba
MILES
0 1 2 3 4 5 10
Aqueducts and Tunnels
Power Stations

FIG. 48 TUMMEL BASIN - STATISTICAL DATA OF POWER STATION

Scheme	Station	Catchment Area (Sq. miles)	Catchment Area Av. Rainfall	Gross Head (feet)	Dam	No. of Setts & Capacity (k.W.)	Total Plant Cap.(k.W.)	Est. Av. Annual Output (millions of units)
Tummel Valley	Cuaich	56	60	82	Loch Cuaich	1 x 2,500	2,500	9
	Ericht	35	70	180	Loch Garry	1 x 2,200	2,200	11
	Trinafour	86	55	300	Loch Errochty	1 x 550	550	2
	Gaur	93	69	92	Loch Eigheach	1 x 6,000 1 x 400	6,400	17
	Rannoch	177	65	512	Loch Ericht	3 x 16,000	48,000	174
	Tummel	377	62	173	Dunalastair Res.	2 x 17,000	34,000	120
	Errochty	86	55	610	Loch Errochty	3 x 25,000	75,000	84
	Clunie	515	60	173	Loch Tummel	3 x 20,400	61,200	165
	Pitlochry	706	55	50	Loch Faskally	2 x 7,500	15,000	55
							254,850	637
	Laidon[a]	49	75	105	Loch Laidon	1 x 5,000	5,000	16
							259,850	653

[a] Projected. Details of scheme published April, 1962.

B. CHANGES IN THE PHYSICAL ENVIRONMENT

(i) The Effect on Amenity

When the Board announced their Tummel-Garry Scheme early in 1945, such a wave of critism was raised that in retrospect, one may regard this scheme as "the part-:ing of the ways." The North of Scotland Hydro-Electric Board was barely a year old. Already the Board had experienced opposition following the publication of their Loch Sloy Scheme the previous year, but as a consequence of a public inquiry held in December 1944, they had been given parliamentary permission to proceed with that scheme. Now, following the publication of their Construction Scheme No. 2, namely, the Tummel-Garry Scheme, the Board were confronted with what has until now proved to be their greatest test and in many minds has since proved to be their greatest triumph, as we shall read in the following pages.

In some ways it was unfortunate that the Board should have chosen the Tummel-Garry Scheme as their second scheme of construction, for the scheme entailing within its project the harnessing of two of Scotland's major rivers amidst some of Scotland's most scenic, best known and best loved tourist areas, was bound to arouse much adverse criticism from a public who had as yet had no experience of the Board's achievements in the safeguard of amenity. It is little wonder that the then Chairman of the Board, the Earl of Airlie, obviously harassed and seemingly under fire from all sides, is reckoned to have exclaimed in exasperation,"Do the people of Scotland want electricity, or do they not?" On the other hand the scheme was a sort of initiation test for the Board. It boiled down to a test case as to whether or not amenity, tourism and agriculture taken together, were powerful enough to sterilise permanently the potential capacity of the waters of the rivers Tummel and Garry and their tributaries for the generation of electricity. As a conse-:quence of the urgency of the public need then prevailing, the battle was fought and won in favour of the latter. Before reading further, the reader is referred to what has already been written concerning amenity in the introductory chapter on this subject under Section II, Part 1.

The scheme was approved by the Electricity Commissioners on 7th February, 1945, and thereafter submitted to the Secretary of State for confirmation. Public notice of the submission was given on 9th February and subsequent dates.

The Board did not have the backing of the Amenities and Fisheries Committees in their new project. Both Committees suggested considerable amendment to the Board's proposals which in turn were rejected by the Board. Here is a summary of the views and opinions expressed by the Amenities and Fisheries Committees on the scheme.

Amenity

The Amenities Committee considered the effect of the rise and fall of the enlarged Loch Tummel. They concluded that although the rise and fall of the level of the loch might lead to the creation of some unsightly areas at the west end of the loch, they felt that this change must be accepted.

While regretting the projected disappearance of the Falls of Bruar, they were of the opinion that it would in principle be most regrettable that much exceptionally beautiful scenery in the lower reaches of the Tummel and the Garry in the vicinity of Pitlochry should be submerged, particularly since this scenery was so easily accessible to the public. In consequence the Committee considered it should be preserved unspoilt as a national asset and recommended by majority decision (three votes to two) that the Board should not be given power to go forward with the construction of works at Pitlochry.

The Committee unanimously recommended that all pipe-lines should be made as inconspicuous as possible and further recommended that they should be consulted as to the appearance and finish of the fish ladders to be constructed.

Fisheries

The Fisheries Committee of which Col. Sir.D. W.Cameron of Lochiel was chairman, stated that they felt they could not do otherwise than to recommend[a] that the part

a This was a unanimous decision taken by four members of the Fisheries Committee. The remaining member who had a personal interest in the project, took no part in the discussion.

of the project relating to the impounding of the waters of the Upper Garry, the Bruar and other tributaries above the Falls of Struan, should be abandoned.

With regard to the works at Pitlochry, they recommended that the amount of water to be discharged from the dam at Pitlochry should be at a rate of not less than 45 million gallons per day and that the fish ladder and other works for the passage of this compensation water, should be designed and built to the satisfac-:tion of the Committee.

The Committee pointed out that the salmon angling between the proposed Clunie and Pitlochry dams would be completely ruined and as there was no recommendation they could make which would alleviate this situation, monetary compensation would, therefore, have to be paid.

The Board announced that they did not accept the Amenities Committee's recom-:mendation that they should not take powers to proceed with the Pitlochry dam and power station and that they did not accept the recommendation of the Fisheries Committee that the works relating to the Upper Garry, the Bruar and other tributa-:ries above the Falls of Struan, should be abandoned.

The reader is reminded that under the Hydro-Electric Development (Scotland) Act, 1943, the Board were in no sense, subject to sub-section 4 of the Act, obliged to accept the recommendations of the Amenities and Fisheries Committees. The latters' purpose is not to dictate but to give advice and assistance to the Board and to the Secretary of State on such matters.

The following comments, speeches and letters reported in the press bear witness of a fairly considerable body of opinion which was levelled against the proposed Tummel-Garry Scheme. A good proportion of this criticism was fomented locally.

"Pitlochry (in Gaelic, 'Pit-cloichaire' - the place of the sentinel stone) is living up to the implications of its name. A Vigilance Committee has been set up to oppose the scheme - to prevent, 'the whole face of the countryside being changed.' A member of the Committee stated, 'The people of Pitlochry will not benefit in the slightest by the proposed scheme. It will have the very opposite effect.' The tourist industry will be adversely affected.

'If it was intended to help Mrs. Brown here, on one of the hillsides, in the way of providing her with modern-day conveniences, it would be a good thing, but if it is going to help Mrs. Brown in Clydebank and mar Mrs. Brown's hillside here, it should not be tolerated.' " - Col. James Robertson, C.O., North Perthshire Home Guard.

From "The Bulletin," 28th September, 1944.

"Many people have become more or less resident in Pitlochry because of the health-giving nature of the countryside, particularly the beautiful wooded walks by the turbulent winding river so soon to be transformed into two, more or less, stagnant dams below Loch Tummel and lined (as one writer put it) with power houses, pylons, and sagging wires. One can visualise the freshness of the swiftly flowing river giving place to these stagnant dams and becoming the breeding ground of millions of midges and mosquitoes, and some people are prophesying these dams will draw fogs and a damp atmosphere guaranteed to promote the growth of that most virulent disease, rheumatism."

Extract from a letter signed "D. A.Buster, Pitlochry," to the Dundee "Courier and Advertiser," 19th March, 1945.

"Colonel Robertson, Managing Director of the Atholl Palace Hotel, Pitlochry, since 1930, estimated the number of visitors to Pitlochry during a normal season, not including day visitors, at 50,000, in the course of eight or nine months. The average length of stay was about five days. Overall, on the hotel services of Pitlochry alone, about £200,000 would be spent each year - an average of £4 per head. In addition there were a very large number of daily visitors. A staff of about 750 was employed for visitors. In the height of the tourist season until the end of September, there was a very large traffic in charabancs and there was an increasing number of tourists from England coming as far as from Hastings and Bournemonth, their object being to see the beauties of Pitlochry. About 15,000 people a year came to Pitlochry by charabanc and the figure was still rising. He believed there would be a serious falling off in this traffic if the scheme goes through."

It was also reported that through the flooding of agricultural land, 33 men and 23 women would be deprived of their permanent work as a result of hydro-electric operations. To these figures a number of occasional workers could be added.

From "The Scotsman," 4th May, 1945.

"The Board are treating the Scottish people like children and as silly, uneducated children at that. We must not object, they say, if they wash away the beauty spots because they will give us new ones. If they submerge our old historic Cluny Bridge we must not burst into tears because they will build a new one. They are generously prepared to allow sufficient water to flow over the Falls of Tummel in the tourist season.

"Beauty must surely mean nothing to the Hydro-Electric Board if they imagine that a mechanical waterfall and an ersatz bridge are going to be proper substitutes for old loved treasures." - Sir Iain Colquhoun, Chairman of the National Trust Council for Scotland.

From the "Scottish Daily Mail," 1st March, 1945.

Finally a contributor to the "Field Magazine," dated 10th November, 1945, declared that the Board were going "to ruin the wild beauty of the River Garry," that they were to construct "hideous dams and aqueducts" which would "not merely desecrate the Highland glens but blot them out as surely as Mt. Vesuvious blotted out Pompeii. What on earth is the point of these vast engineering works erected

at an incredible expenditure of public money, ignoring the considerable Scottish coalfields, wasting 15% to 20% in transmission losses, sacrificing the county and its local industries, driving away the holidaymakers, smashing up the crofts, inundating the low ground and generally playing hell with a once lovely land?"

He wound up by likening the Board to "Government promoters, financial boosters and money lenders."

The Public Inquiry into the Tummel-Garry Scheme

Whatever one's views today on this selection of correspondence and comments, one must bear in mind that these opinions were expressed by people who undoubtedly in good faith felt it their patriotic duty to defend the beautiful countryside of the Highlands, and in particular, of Northern Perthshire, against this latest threat to amenity. In consequence a public inquiry into the scheme was held in Parliament House, Edinburgh, from 25th-28th April and 1st-5th May, 1945. The appointed tribunal also visited the site of the proposed scheme on 11th and 12th May. 25 objections by various individuals and bodies were lodged against the scheme. 11 of these were later withdrawn leaving 14 who were represented at the inquiry. These were:-

The Joint County Council of Perth and Kinross.
The Town Council of Perth.
The Grampian Electricity Supply Company.
The Tay District Salmon FisheriesBoard.
The Tay Salmon Fisheries Company Limited.
The Tay Salmon Fisheries Proprietors.
The National Trust for Scotland.
The Scottish Travel Association.
The Hotels and Restaurants Association.
The Association for the Preservation of Rural Scotland.
Atholl Properties Limited.
The Royal Scottish Automobile Club.
Pitlochry Ratepayers and Residenters and Others.
Captain W.T. Shaw, M.P.

Briefy the main arguments against the scheme were on grounds of (a) amenity and related effects on tourism, (b) fisheries, particularly salmon fisheries and related effects on tourism and employment, and (c) agriculture. These may be listed as follows:-

(a) Amenity

(1) The scheme would despoil one of the best loved, best known and most beautiful

parts of the Highlands.

(2) That by so doing the tourist industry would be adversely affected with consequent loss to trade and livelihood.

(b) Fisheries

(1) The spawning beds on the Rivers Tummel and Garry would be adversely affected such as to radically interfere with their future as salmon rivers.

(2) The dams and fish ladders would interfere with the free movement of fish.

(c) Agriculture

(1) The farms would be affected to varying degrees by flooding.

(2) In consequence, wintering would be lost for an estimated 1500 sheep.

(3) There would be a possible reduction in one herd of T.T. cattle.

(4) An estimated 50 people would be displaced from their present employment.

In favour of the scheme the Board argued that it had been designed primarily as a revenue earning scheme and that the development of such schemes were essential if unremunerative schemes to supply remote areas were to be built of which the scheme at Gairloch was cited as an example. By promoting the Tummel-Garry Scheme the Board were simply carrying out the Cooper Committee's recommendations as embodied in the 1943 Act, namely, that the Board "will finance the distribution of electricity in remote areas where supplies would otherwise be an economic possibility, by the sale of surplus power at a profit to the Central Electricity Board."

The Board pointed out that the stations of the proposed Tummel-Garry Scheme were designed to meet different load factors, a necessary criterion if the scheme was to be revenue earning. For example, Pitlochry was designed for an annual load factor of 40% but also to meet peak loads of 90%, Clunie for a load factor of 22% and Errochty for a load factor of 12%. Errochty was also designed to be run intermittently to meet peak loads over short periods.

The Board further suggested that the Pitlochry reservoir would act as a balan-:cing reservoir which would help "iron out" fluctuations in the flow of the River

Tummel. This would in turn be of benefit to both fish and the fisheries of the river.

Finally, as suggested in Clause 16 of the Constructional Scheme, the scheme would give priority to local men as regards employment. A peak of 2,000 men would be employed at Pitlochry and Clunie and 2,500 at Errochty. This would serve as a boost to the local economy.

In addition to the suggestions made by the Amenities and Fisheries Committees that certain sections of the scheme should be abandoned, the Tribunal also had before them proposals made by the Joint County Council of Perth and Kinross that Loch Tummel ought to be raised only 10 ft. instead of 17ft., and that the proposal to build a dam at Pitlochry be dropped. These suggestions had likewise been rejected by the Board for reasons which were mainly on the grounds that any paring down of the scheme would result not only in the whole project being made less efficient but it would no longer meet with the Board's requirements. The Board had also intimated that the scheme, if allowed to go through, would contribute an extra £20,000 annually to the Perthshire rates.

The following is a broad summary of the findings of the Tribunal of Inquiry reached after careful analysis of all the arguments made in favour and against the scheme and after they themselves had visited the sites of the various works in the proposed scheme.

(a) Amenity

Much conflicting evidence was expressed as to the effects of the scheme on local amenity but mutual contradictions had only served to complicate the issue and had emphasised the difficulty of estimating any practical measure of amenity. Undoubtedly, the Upper Garvy and tributaries and the Falls of Tummel through the abstraction of water would be adversely affected but the Queen's View at Loch Tummel would not be adversely affected as the present fluctuations in the level of the loch are more than would be permitted under the scheme. The Pass of Killiecrankie would remain unaffected apart from a lessened flow of water in the river while the creation of a new loch at Faskally would not necessarily be an irreparable loss for much beauty would remain. While the Old Clunie Bridge in its beautiful setting would be lost,

this was not regarded as "an irreplaceable monument of the historic past". If, as suggested, the scheme injected new life into the Highlands, then this was a small price to pay. The Board's plans for creating a new recreation ground at Pitlochry were noted and favourably commented upon.

There was no evidence to suggest that there would be a permanent loss of trade to Pitlochry as a consequence of the scheme. Pitlochry's popularity was largely due to its accessibility. Even considerable reconstruction work on the A9 (Great North Road) had resulted in no appreciable loss of trade. Any losses entailed would be felt only by those in direct contact with construction work on the scheme and even then, these would be only of a temporary nature.

In conclusion there was evidence to suggest that overall there would be no substantial loss to amenity following the construction of the dams and power stations proposed and that those, through close collaboration between the Board and the Amenities Committee, could be built to harmonise with their surroundings.

(b) Fisheries

As with amenity there was an acute divergence of opinion as to the extent of damage likely to be caused by the scheme. This was supported by the fact that there had been no attempt made to quantify any of the apprehended loss. In con-:sequence it was considered unwise to try to predict and assess the extent of the damage which might follow the construction of the scheme.

Many spawning beds in both the Tummel and Garry would be destroyed, either through inundation or water abstraction, but it was noted that the Board had plans to adapt the Errochty as a spawning river to take their place. It was, of course, impossible to assess with what success this experiment would meet. To pass any final judgement on the scheme could only be done by drawing on inconclusive evidence. As an illustration of this, an earlier example was quoted that"in 1942, by which time the adverse effects of the Grampian Company's operations in the Loch Garry area might well have been expected to show themselves, the spawning season for that year in the Upper Garry was exceptionally good".

Similarly, the effect of salmon ladders remained quite unresolved despite the controversy raised over the proposed dam and ladder at Pitlochry. The Tribunal

noted the proposals for compensation water incorporated in the scheme which, though not generous, were considered satisfactory. They further noted that the Board had no plans to divert water from the Tarf-Tilt - a major spawning river.

In conclusion it was considered that any damage which would follow was insuf-:ficient to bar the scheme.

(c) Agriculture

Taking into consideration the losses maintained by objectors to the scheme, it was pointed out that adequate compensation would be paid for any losses suffered. They did not, however, agree that the balance of agriculture in the district would be upset as a consequence of the scheme, for "the total acreage of land capable of being cropped or used for pasture which will be submerged is negligible in the light of the larger issues involved".

The general conclusion reached by the Tribunal was that whether taken indi-:vidually or together, neither the effects on agriculture nor fisheries were sufficient to bar the scheme but when coupled with the issue of amenity, the final decision must "depend on the urgency of the public need".

Strong objections to the Tummel-Garry Scheme were raised in the House of Commons, notably by the Conservative M.P. for West Perthshire - Mr. J. Snadden. Able support for the scheme was expressed by Labour M.P.'s skilfully led by the Scottish Secretary, then Mr. Thomas Johnston, and who soon afterwards was to become the Chairman of the Hydro Board. A motion to annul the scheme during the Common's debate on the matter in mid-November, 1945, was defeated by 263 votes to 45.

Thus, after a long and drawn-out struggle the North of Scotland Hydro-Electric Board secured permission, subject to the provisions embodied within the publication, "Constructional Scheme No. 2", to proceed with what had initially promised and had indeed proved to be probably the most controversial scheme in the history of hydro-electric construction work in Scotland. Yet the controversies raised were mild by comparison with those which promoters of hydro-electric schemes in both Canada and the United States have had at times to contend. For example, the Tennessee Valley Authority was taken 41 times to the Law Courts by various vested interests including coal, ice and artificial fertiliser companies. Nevertheless, public concern as in

the case of the Tummel-Garry Scheme is not necessarily a bad thing. Whatever its demerits it does serve as an indication of the high regard with which Scotland's scenic amenities are held by the public at large and which in turn does much to make the North of Scotland Hydro-Electric Board, or, for that matter any other authority whose developments impinge on areas of exceptional beauty, to take every practicable precaution so as to minimise any interference with amenity in the carrying through of these developments.

In the following consideration of the effects of the Board's schemes on amenity and the consequent effects on tourism in the Tummel Basin, let us commence with the Tummel-Garry Scheme. As with the Beauly, the writer has drawn on the views expressed by many people, both locals and visitors, in reaching the conclusions expressed in this study.

The Tummel-Garry Scheme (1) Pitlochry and Faskally

Perhaps the most striking effect on the physical environment is the changed "face" of the landscape. This is particularly apparent to anyone who knew the area prior to the Board's developments. Undoubtedly, the biggest change is in the valley of the Tummel in the immediate vicinity of Pitlochry. The former river course has been drowned by the creation of a new loch - Faskally - stretching back upstream between wooded banks for nearly $2\frac{1}{2}$ miles to just beyond the confluence of the Garry and Tummel. The dam itself is 54ft. high and incorporates both a fish ladder and power station.[76, 77]

The fish pass is 900 ft. long and comprises 35 pools with a rise of 18 inches between each. An observation chamber is available for tourists to watch the passage of migratory fish. Inside the dam there is a hatchery with accommodation for one million salmon eggs.[a]

The power station, which is faced with pre-cast Aberdeenshire granite slabs, incorporates on its northern gable the crest and motto of the North of Scotland Hydro-Electric Board - "Neart nan Gleann" (Strength or Power from the Glens).

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[a] Page 294.

On the north bank of the river, under the roadway leading to the dam, is a cut-off wall of concrete designed to prevent the natural seepage of water through the sand and gravel which form the river bank and represent riverine deposits dating back to pre-glacial times. This cut-off is about 900 ft. long with a maximum depth of 130 ft. and has helped make possible the landscaping of the approach road to the dam. Two car parks have been provided for tourists visiting the dam.

About half-a-mile downstream from the dam the Tummel is gracefully spanned by the new Aldour Bridge[78] which was built to replace the Old Clunie Bridge. The new bridge provides a link between the two sides of the valley for vehicular traffic while an aluminium footbridge,[79] close by the site of the former Old Clunie Bridge, spans the narrows of Loch Faskally.

Within the past decade Pitlochry has become one of the most popular of Scottish inland resorts. Its geographical location astride the A9 and consequent acces-:sibility together with the post-war boom in motoring are primarily responsible. During the peak holiday period - the months of July and August and the greater part of September - practically every hotel and boarding house is filled to capacity. As an illustration of this the writer, through the local information centre in town, endeavoured to book accommodation - "bed and breakfast" - for the night of 9th August, 1961. The time of calling was 3.15 p.m. The only vacant accommodation in the neighbourhood was at a farm, Mains of Dunfallandy, about 1½ miles from the centre of town on the opposite side of the river. The next nearest accommodation was to be had in Grandtully in Strathtay. Mention need hardly be made that the former accommo-:dation though lacking electricity was gratefully accepted.

As may be deduced from the above tourism has certainly not suffered from the siting of a hydro-electric dam and power station on the very doorstep of the major tourist centre in Northern Perthshire. While Pitlochry and environs have many attractions to commend them to visitors there is little doubt that the outstanding attractions of the past decade have been the Board's works and the Pitlochry Festival Theatre, the latter having proved to be one of the most ambitious and singularly successful projects in the world of Scottish Theatre. The artificial loch at

Faskally may have killed the Tummel's savagery but the roaring waters have been superseded by a placid and gentle beauty which seemingly never fails to attract and thrill the thousands of people who visit the burgh every year. The loch is perhaps at its loveliest in autumn when, ringed by heather-clad hills and the reflections in its calm waters of the golden-leaved trees which shade its banks, it offers a unique charm which few beauty spots within easy access can equal. Undoubtedly, the dam and fish ladder have become a mecca for thousands of tourists, many of whom like the writer always make a point of visiting the loch when calling or passing through the burgh.

Some indication of the popularity of the Board's works and their consequent effects on local tourism may be guaged from the following.

"From a local point of view the Hydro Board and Theatre have 'made' Pitlochry and popularised it as never before. The fish ladder is a source of never-ending interest. Coach parties arrive for two nights' stay on Sundays, Tuesdays and Thursdays, respectively. Their first visit is to the dam and fish ladder ...

The tourist industry has doubled over the last 10 years. Today, there are 29[a] hotels and boarding houses of varying size. Pitlochry has now outstripped its great rival Aberfeldy as regards the provision of tourist accommodation. The busy season now lasts from mid-March to mid-October, compared to June to September, prewar. Evacuees gave a boost to the industry during the war. This was followed by six years of hydro-electric construction work which brought families and relatives of men engaged on construction work. Since the scheme was completed and the pub-:licity given to the Hydro Board, Pitlochry has continued to reap the benefit.

An Information Centre was established in the town in 1953. Today, it is run by the Pitlochry Tourist Association. It is financed by the local hotels at 2/6d. per bedroom. On the spot accommodation is provided for 4-500 tourists each season."

These words were spoken by a local hotelier on being interviewed by the writer in August, 1959. The Board are also highly commended in the 1951 brochure of the famous Atholl Palace hotel which declared:-

"Erstwhile opponents of the scheme agree these changes have brought new beauty into the valley; salmon and trout fishing on the loch and pleasure boating on certain reaches have been added to Pitlochry's many attractions. There are the new hydro-electric works; the dams with their fish passes (artificial aiding nature), the power stations blending into the countryside effortlessly aiding Britain's resources, the new level road[84] from Aldour Bridge to Foss and Tummel Bridge - all these add to the attractions of the Vale of Atholl and its heart, Pitlochry".

These words from the brochure contrast sharply with the views expressed by the Managing Director of the same hotel some years previously.[b] The following views

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[a]Does not include "bed and breakfast" establishments.
[b]Page, 267.

eminently support the opinions expressed by exponents of the tourist industry.

"Most of the criticisms have proved to be unfounded for the Hydro-Electric Board have made an excellent job of the Civil Engineering works involved and have done everything possible to minimise damage to the amenities of the district ... The Pitlochry works are something of a showpiece and thousands of visitors annually visit the Dam and Fish-Ladder, the latter being built to enable salmon to reach the spawning beds ... the advent of the Hydro-Electricity Works, instead of detracting from the amenities, appears to have increased them for the Dam and Fish Ladder is a popular visiting place."[238]

"Overseas visitors to Scotland will find that our huge number of lochs have been increased in recent years. The hydro-electric schemes have resulted in several fine new lochs which, though partly artificial, are in some cases as lovely as any of our natural waters.

Best of all from the scenic point of view is Faskally, a lovely new loch with a magnificently planned "scenery road" in the very heart of Scotland ... This beautiful road runs from Pitlochry by the western shore of the newly formed Loch Faskally, itself a gem of scenery as unlike the usual reservoir as can be imagined.

The dam which has been built across the Tummel at Pitlochry has made this charming loch narrow and winding with high wooded shores and the new road displays it to the best advantage ...

The salmon ladder is a great attraction, crowds flocking all day long to watch the fish ascending the 'steps' as they migrate upstream on their way to the spawning grounds ...

Pitlochry, always a charming and favourite holiday town, has had great publicity of late, both by reason of the great new dam and loch and also on account of the new famous Festival Theatre which is proving extremely popular with all visitors.

A night spent on the way North in this bright and beautiful holiday town will not be dull - there is so much to see, both new and old, that one night can rush into two and the main problem is hotel accommodation.

However, there are plenty of hotels, so it is generally possible to get in somewhere. So if going North, stop in the 'Centre of Scotland'."
From the Glasgow "Evening Times", 22nd August, 1953.

"Hydro-electricity is the only source of power which has so far made a positive contribution to the landscape ... Careful ground shaping blends the dam into its surroundings at Pitlochry."[70]

"Poplar trees and evergreen hedge plants have been placed along the approaches to the Pitlochry dam and power station to enhance the scene. The North of Scotland Hydro-Electric Board has certainly implemented its promise that when the gigantic scheme was completed it would add to, rather than detract from, the scenic beauty of Pitlochry and surroundings. Thousands of summer visitors have found interest in the great white dam, the fish ladder and the power house. Motorists have praised the fine new road, and everyone has enthused over the general picture."
From the "People's Journal", 8th January, 1955.

The following advertisement for the Green Park Hotel which appeared in the press in the spring of 1960, bears further witness to the charms of Loch Faskally.

The Board estimate that over 100,000 people visit the Pitlochry dam, power station and fish ladder per annum. It is only when one is reminded that the resident population of the burgh is a mere $2\frac{1}{2}$ thousand that the significance of the former figure can be fully and best realised.

Need more be said. While the great upsurge in tourism in Pitlochry and district is, as aforesaid, primarily due to its geographical location, there can be no doubt that the Board's works have contributed to the attractions of this area of Perthshire. Indeed, during the writer's many travels in the area, nobody was met with who did not extol the beauties and attractions of the dam, fish pass and new loch. The scheme is apparently of particular interest to visitors from south of the border. Recently, British Railways have extended their Television Train Service which caters for educa-:tional excursions for school children, youth organisations and others, to include Pitlochry within their itinerary. And why? To visit the hydro-electric dam and fish pass, of course! British Railways' officials assured the writer that the presence of and attractions of the scheme were the main reasons for including Pitlochry in their tours. Having accompanied school children on one of these visits during which he acted as compere, the writer can vouch for the fact that the visit to the hydro-electric scheme "made" their day, and although the salmon did not "play up" to them on this occasion through the observation chamber window, a large salmon was readily detected lying unperturbed in the still waters of the loch close by the automatic spillway drum gates of the dam. This proved a source of wonder and excitement to all.

An added attraction to holiday makers and locals alike is the boating and fishing to be had on Loch Faskally. This business has been established by Mr. H. Sands, who in turn leases the fishing rights on the loch from the Board. The Board in consultation with local angling interests, have taken steps to main-:tain and improve the stock of trout in the loch by the planting of large numbers of fry and yearlings.[a]

A few hundred yards downstream from the dam the Board have created a new recreation ground, including tennis courts, which replaces the old park inundated by Loch Faskally. Among the many attractions held annually in the park, is the Pitlochry Highland Games which takes place on the first Saturday in September, and is one of the premier events of its kind in the country.

Without wishing to detract from the attractions of the unique and widely known Festival Theatre and the many and varied natural charms of the Pitlochry area, the writer has no hesitation in concluding that had the Board been prevented from carrying through their Tummel-Garry Scheme, the area, and in particular the burgh, would have been the poorer today. Faskally has not only proved the critics wrong but has justifiably borne out the Cooper Committee's dictum "that intensive develop-:ment of water resources is perfectly compatible with the retention, and indeed the expansion, of an extensive and important tourist industry in the areas so developed".[b]

(2) Loch Tummel

Some miles to the west in Strathtummel lies Loch Tummel, the level of which has been raised 17 ft. by the Clunie Dam. The enlarged loch is noticeably both wider and larger, indeed its present length extends to 7 miles compared to a previous length of 3 miles. Large stretches of rather marshy land at either end, over which the river formerly meandered, are now inundated. In consequence, the Queen's View incorporates a much greater stretch of water than previously.[82, 83]

Undoubtedly, one's opinion of the present vista in comparison with the past, will be influenced by one's own particular liking for water in a landscape.

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[a] Page 295

[b] Pages 71 and 72

Nevertheless, the fact remains that thousands of tourists still annually stop to gaze in wonderment at the panoramic view of mountain and loch before them, few realising that the loch below is an enlarged and artificial reservoir. The new loch blends naturally with the landscape and therein lies the secret of the Board's success. Amenity has been retained if not enhanced.

"The enlargement of Loch Tummel itself has created one of the most beautiful sheets of water in the country. The long water takes its shape from the surrounding hills and the margin is varied and natural. In places the wooded shore is broken by green fields coming down to the water's edge. The new road[84] fits quietly and efficiently into the contours. In most places an unobtrusive fence of post and wire is set back within the woodland."[70]

"Loch Tummel was always a beautiful water ... ; now it is both larger and rather improved, the great expanse of water enriching the view of its wooded hillsides ...
From the Glasgow "Evening Times", 22nd August, 1953.

(3) Loch Errochty

Loch Errochty was created to meet the requirements of the Errochty Power Station which, as has already been indicated, was essentially designed as a peak load station. In consequence, the loch is subject to considerable draw-off, resulting in much shingle being exposed round the sides and at the head of the loch when the water level is low. Fortunately, the upper end of the loch is remote, and although the Board allow tourists to use the access road to the dam, this is of little consequence from the amenity angle.[85], [86], [87], [88], [89], [90], [91].

(4) The Rivers Garry and Bruar

The diversion of water from the Garry and its tributaries, particularly the Bruar, has had serious consequences on the amenity of the rivers in question. About a mile upstream from the Edendon Bridge on the A.9, the Garry waters are channelled by a weir into a tunnel which leads through the hills to Loch Errochty.[92] Upstream from this point,[95] the flow of the Garry is seriously diminished except in times of flood owing to the diversion of water from Loch Garry by tunnel to Loch Ericht.[a] Downstream from the weir, as far as Struan, the Garry represents for the most part a dry river bed[96] except in times of flood when the floodwaters pass over the weir. From the amenity angle and also from the fishing point of view,[a] this

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[a]Page 297.

"desecreation of the Garry" as it has so often been called, constitutes the biggest loss resulting from the scheme. The river flow has been entirely sacrificed in the interests of hydro-electric generation, but had the price paid to be such a large one? In the interests of amenity - for long stretches, the Garry runs parallel to the Great North Road, one of the main tourist arteries in Scotland - could not a flow of water been maintained in the river say, in the form of compensation water, as has been done elsewhere, at least during the tourist season? While appreciating the loss which this would undoubtedly entail to the economics of successful hydro-electric generation, the writer is, nevertheless, of the opinion that the case in point merits special consideration and that steps ought to have been taken and agreed upon - this could still be done - to maintain a flow of water in the river. If such had been or were still to be done, this would undoubtedly do much to eliminate the difficulties at present being experienced by spawning fish in the Garry between Struan and Blair Atholl.[a]

The loss of water in the tributary rivers is of little consequence scenically except in the case of the Bruar, with its noted falls. It was indeed most unfor-:tunate that the Board's offer to maintain a compensation flow over the falls during the tourist season was rejected as of no value, for, except after a period of pro-:longed rain, the falls now have little to recommend them to the visitor.[b] 97 Perhaps if this offer had not been rejected, negotiations with the Board might well have led to a similar agreement for the Garry.

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[a] Page 297.

[b] At Niagara, the scenic attractions of the falls are maintained through the dis-:charge of a large volume of compensation water during the day. At night, almost the entire flow is diverted for use for electrical generation. This artificial control of the falls - the shutting off and on of the flow at will - has much to commend it and is done without the awareness of the vast majority of the tens of thousands of tourists who visit the falls annually. Might not this American innovation be copied in Scotland, if only in exceptional cases such as the Falls of Bruar, which rank among our finer and more renowned beauty spots. Of course, the author is aware, that the differences in size and regime between Scottish and North American rivers, may constitute difficulties in this country which may or may not be easily resolved in the interests of profitable hydro-electric generation.

(5) The Linn of Tummel[a]

While the "hot boiling flood" has been somewhat tamed through the diminished flow of water in this section of the Tummel, the writer cannot agree that the diminished flow constitutes the "substantial and regrettable alteration" to the landscape,[12, 98] as was predicted at the Tummel-Garry inquiry. While there no longer remains the excitement of visiting the falls in spate after heavy rain - The Clunie Dam is not designed to spill - the volume today approximates to the dry-weather flow of pre-hydro days.

It is readily apparent that the Board have taken great care to blend their dams and power stations with the natural landscape, all four power stations - Pitlochry, Clunie, Errochty and Trinafour - being faced with pre-cast granite slabs. Nowhere are pipes readily visible to the passing tourist, except for one which diverts water from the Allt Culaobh into the Errochty Tunnel opposite Dalnacardoch Lodge on the A.9.[99]

Equally, care has been manifested in the siting of transmission lines. For example, the Amenities Committee suggested the carrying of transmission lines along the south rather than along the north side of Loch Tummel. To this the Board readily agreed. On the other hand it has, in places, been necessary to erect parallel lines of towers because of capital costs and costs of operation, repairs and maintenance. It is maintained that to put such lines underground[b] would be financially prohibitive.

As elsewhere, the construction of the Tummel-Garry Scheme resulted in an overall improvement in the roads serving the area. Reference has already been made to the fine new Aldour Bridge. The mileage of roads constructed, diverted or reconstructed as a result of the scheme is as follows.

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[a] The former falls were renamed in 1959.

[b] Power is, nevertheless, transmitted from Pitlochry Station to Clunie and again from Errochty Station to Errochty Switching Station by means of underground cables. In both cases relatively short distances are involved. Considering the care taken to blend the Pitlochry scheme with its surroundings, it is somewhat surprising that more care was not taken when siting the pylons on Creag Dhubh - the hill opposite Pitlochry. At least one pylon appears on the skyline. Is there not a case here for putting the cables underground, at least where they appear most conspicuous from the town and dam site?

Scheme	Public roads diverted or reconstructed. Miles	New access roads or private roads diverted or reconstructed as access roads Miles
Tummel-Garry	10.0	1.5

These roads are a permanent contribution to both tourists and locals alike. In the past the road by the south side of Loch Tummel was "not much better than a grass-grown track".[a] Today it has been largely realigned and reconstructed and offers superb views of Loch Tummel.[84] It is held in particular esteem by the local agriculturalists. In places the old road is still visible runnind down to the water's edge. Similarly, along the north shore, the main road to Rannoch (B8019) has been realigned and reconstructed between Aldcharmaig and Bohally,[100,101] while a new bridge (temporary) replaces the old Bridge of Garry near the junction of the B8019 and A.9. In Glen Errochty a fine new access road is open to the public as far as the Errochty dam. Much favourable comment was passed on the new road leading to the Pitlochry Dam.

One of the local objections to the scheme at the time of promotion was the belief that the landscap would be scarred permanently as a result of the Board's construction work. In any major construction project there is bound to be con-:siderable disorder and scarring at the site in the early stages while work is in progress. This is evident from the accompanying photographs showing construction work in progress on the Pitlochry Dam site.[76, 77] But as elsewhere, this dis-:figurement of the countryside proved to be only of temporary consequence. Today, the dams and power stations in the Tummel-Garry Scheme, in particular those at Pitlochry and Clunie, are fine examples of the finished product and of what can be done in the harmonious blending of the edifices of man with the natural landscape.

In conclusion, considering the volume of criticism raised against the North of Scotland Hydro-Electric Board when the Tummel-Garry Scheme was first made public, one cannot but do otherwise, having considered the final product, than to compliment the Board on having carried out this scheme, with a few notable exceptions, mainly

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[a] A local description.

the Middle Garry and Bruar, with infinite care and thereby favourable regard to the amenities of this renowned and exceedingly beautiful corner of Perthshire. Indeed, their works have in places, for example, Pitlochry, rather enhanced the scene and added to the tourist attractions of the area. One can with confidence endorse the words of Sylvia Gray who wrote: "The landscape profit and loss account shows a credit balance in the Tummel-Garry Scheme".[70]

The remaining post-war hydro schemes are small and of much less importance than the Tummel-Garry Scheme, yet again there is abundant evidence that care has been taken in the siting of dams, power stations, aqueducts and transmission lines, so that they may blend as far as possible with the natural landscape.

Gaur Scheme

The largest single scheme in this group is the Gaur project which has greatly enlarged the former Loch Eigheach and necessitated the reconstruction and realign-:ment of the B846 leading to Rannoch Station. This road is also part of the historic "Road to the Isles",[103, 104] the grass covered track of which leading to Corrour and beyond, diverges northwards from the B846 close by the west end of the enlarged loch. An interesting though indirect benefit to amenity accruing from the scheme, is the more regular flow of the River Gaur during the summer months below the power station, thus contributing to the maintenance of the scenic beauty of the rapids at Dunan[105] to the benefit of both tourists and anglers.

Laidon Project

To the west of Rannoch station lies Loch Laidon. The Board have recently published plans for a new scheme[a] here costing approximately £1½ million. Scenically the scheme will make little change to the present landscape other than to add to the already extensive area of water on the moor through enlarging the area of the present loch. The scheme will necessitate the building of an access

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[a]Published in April, 1962.

road westward from the railway station. If, and when constructed, the hydro road would seem to offer the optimum moment for considering further road building (about 10 miles) across the wastes of Rannoch Moor, to link up with the main Glasgow - Fort William road (A.82), via Tyndrum and Glencoe, and so adding not only an interesting new tourist route through the Central Highlands but a necessary and valuable economic and social link across Scotland.

Northwards from Bridge of Ericht, the Board have extended the road first built by the Grampian Company to their Loch Ericht Dam site - this was formerly a drove road - a further 10 miles through Taladh Bheith Forest to Coire Bhachdaidh Lodge, nearby which is the site of their recently completed Ericht Power Station,[a] at the outfall of the Garry Tunnel on Loch Erichtside. The road rises to a maxi-:mum elevation of 2,100 ft. and commands extensive views of the Central Highlands. Deer are a common sight even in mid-summer. At present (August 1961), the road is not open to tourist traffic, but now that the scheme is completed there is a strong case that it be opened as a net addition to the scenic routes of North Perthshire.

Further downstream at Tummel Bridge, as noted in the introduction to this Section, is the main power collecting point for all the electricity produced in the valley, namely the Errochty 132kV. Switching Station, to which double circuit lines run from Clunie, Tummel Bridge and Rannoch power stations. Because of its geog-:raphical location - it is literally in the heart of Scotland and centrally placed to a considerable number of hydro stations - this is the largest switching station of its kind in the Board's area and has several 132 kV. lines radiating from it. These are:-

(1) One line runs northwards by way of Trinafour, Dalnacardoch, Drumochter, Corrieyairick and the Great Glen to Fort Augustus, with further connections to hydro-electric stations and distribution centres in north and north-east Scotland.

(2) Two lines transmit power to the South of Scotland Electricity Board's grid at Bonnybridge, Stirlingshire, and Abernethy, Perthshire, respectively.

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[a]The scheme became operational in August, 1962.

(3) One line links the Tummel Valley Group of Stations with the Breadalbane and Loch Sloy Groups.

(4) Finally, a double circuit line links the Tummel Valley with switching stations at Charleston and Tealing in Angus, north of Dundee. This line also links with the Clunie Power Station.

The Errochty Switching Station is situation on the south bank of the River Tummel opposite Errochty Power Station and close by where the river now enters the greatly enlarged Loch Tummel. As the number of generating plants in an area increases, so there will be an increase in the number of short transmission lines to convey output into the general system and thus, there will be an increasing need for main switching centres on which many transmission lines will converge. Errochty is a notable example of such a station and already the concentration of lines is beginning to look excessive. It is at such centres that treatment requires to be imaginative if serious interference with scenic values is to be avoided. To try to conceal such a large station as Errochty completely by the planting of trees and shrubs as the Board have attempted elsewhere, would be well nigh impossible, but must the station remain completely bare and open to the view of all who pass along the B8019 - the main road linking Pitlochry and Tummel Bridge?[107]

To some the march of the pylons across the Highland hills constitutes a greater threat to amenity than the relatively localised effects which may follow the siting of dams and power stations. Lines of pylons are particularly noticeable from the B846 south of Tummel Bridge, or again, from the Great North Road north of Blair Atholl. Elsewhere,[a] brief mention was given as to the economic necessity of using overhead transmission in place of underground cables over mountainous terrain. It is not always appreciated that underground cables also require insulation along their whole length and expensive compensating equipment at regular intervals, whereas in the case of overhead lines, the air acts as a natural insulator except at points of support.

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[a]Page 281.

Without doubt, much can be achieved by correctly siting pylons so as to fit as unobtrusively into the landscape as possible. This may not be always practic-:able, particularly where the landscape is open or relatively flat, as in the cases mentioned above. On the moors south of Tummel Bridge, owing to the nearness of the Errochty Switching Station and for reasons that the area lies midway between two groups of hydro stations, namely, the Lawers and Tummel Valley groups, and lies astride the main transmission route between Errochty and the Lowland grid, the area is literally alive with pylons. Yet despite the critics, and there are many judging by the correspondence columns of the press, local people, seemingly, no longer find the pylons distracting. To them they are now part of the natural scene and effective carriers of vital power to local farms and crofts. It is significant that those who shout loudest in their condemnation are those who live furthest from the pylons and consequently, are not dependent upon them for their own electricity supply. There can be few who would seek to deprive any consumer of the advantages of electricity on grounds of amenity and as long as underground transmission remains economically prohibitive over long distances across mountainous terrain,[a] then overhead transmission by cables strung between pylons must remain as the chief means of transmitting electrical power. It is to the Board's credit that where possible they have, in the main, taken care to site pylons unobtrusively or along routes considered best for safeguarding local amenity.

. Perhaps Michael Molinaire had the right approach to pylons when he wrote:-

" ...march of progress. Like six-armed creatures from Outer Space, striding, striding ... This, I said, is not what the tourists come to see, but I am not a tourist and these gaunt intruders are here by invitation. The swooping cables that link them in a sort of harness carry the power behind Scotland's elbow. Millions of vital made-in-Scotland volts for canny engineers to use and bonnie wives to cook with. Obligingly the creatures halted while I focussed ... Click! And at that they were striding off again with their arms in a gawky mask of progress. I[b] came away with that tune from 'The Sorcerer's Apprentice' thumping in my head".

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[a]Underground transmission is rated, on average, at ten times the cost of overhead transmission.

[b]Written by Michael Molinaire, international photographer, recently (1962) invited and commissioned by the National Commercial Bank of Scotland to take a new-lens look at Scotland.

The Pre-War Grampian Schemes

Loch Ericht was the Company's main storage reservoir and, therefore, like Errochty is subject to considerable draw-off and hence fluctuation in level. This is of little consequence scenically as the loch is seldom visited by tourists. Nevertheless, must the old boats used for ferrying materials during the construction period remain beached on the shores of the loch as a rusty memorial to those who laboured on the site? The River Ericht like the Middle Garry is but a rocky memory.

Loch Rannoch is merely controlled by a weir allowing an 8 ft. range in loch level and so scenically remains unimpaired.

Further downstream, the Dunalastair Reservoir occupies the greater part of the haughland known as Bunrannoch reclaimed last century to form the largest area of arable land in Rannoch. In 1930-33, this land was flooded to a depth of several feet to form the new reservoir and consequently, presents rather a depressing scene of reedy water and marshland from which project old dykes and trees. Locally the change was regarded as of greater significance agriculturally than from the point of view of amenity.

In terms of amenity probably the most apparent contrasts between the pre-war and post war hydro schemes in the basin, are to be seen in the differences in architectural styles and in the materials used in construction. The brick built power stations of the old Grampian Company at Rannoch and Tummel Bridge, retaining as they do their wartime camouflage, seem singularly ugly to the eye in comparison with the new stations. Tummel Bridge may be cited as an example of the older type of hydro village. With its old camp site still intact, rather unkempt looking power station and nearby switching station, the village is probably the least attractive in the basin. Further, at both Tummel Bridge and Rannoch, the pipes leading to the power stations are open to view and somewhat detract from the amenity of their immediate neighbourhood. In the former area, the spread of undergrowth, notably birch, has now partially hidden the pipes from view.[111, 112] The open contour aqueduct[113] between Dunalastair and Tummel Bridge is not readily visible

from the road. Since the Forestry Commission have plans to plant the hill below the aqueduct, it will soon be entirely hidden from view.

It would seem feasible to suggest that the Grampian Company's works at Tummel Bridge and the earlier schemes at Kinlochleven and Fort William, must bear much of the blame for the criticism levelled against the Board at the time of publication of their Tummel-Garry Scheme. The relative neglect of amenity in these earlier schemes made the general public somewhat dubious about the wisdom of allowing the newly constituted North of Scotland Hydro-Electric Board to "tamper" with the remaining amenities of Northern Perthshire. But can one with sincerity really blame the Grampian Company? Rightly so, the Cooper Committee complimented the Company on being competent suppliers of electricity. Con-:sidering that the Grampian Company received no assistance, financial or other-:wise, and yet constructed its major power stations in the midst of an economic depression, their record is indeed a good one. But the conditions under which the Company's schemes were constructed were hardly conducive to the execution of sound planning for the preservation of local amenity and so in 1940, when their existing plant capacity was absorbed and the Company sought powers to proceed with further hydro-electric development, their claims were not sub-:stantiated. When the Cooper Committee reported that in their view the water resources of the Highlands should be developed by way of a comprehensive plan of action under the direction of an entirely new authority, the North of Scotland Hydro-Electric Board, this put paid to any future privately financed hydro schemes in the Highlands. Without wishing to become involved in poli-:tical argument, there is enough evidence to suggest that on amenity grounds this was a wise decision. Further, the general findings of this report are that adequate provision has been made and taken by the North of Scotland Hydro-Electric Board for the preservation and safeguard of amenity in the harnessing

of the water resources of the Tummel Basin for hydro-electric development.[a]

Overall the Board's works are highly commendable.

[a]Details of a plan to survey the beauty of Scotland was announced by Lord Craigton, Minister of State, at a Scottish Office Press Conference in London on 6th June, 1962. A circular was later sent to all local authorities drawing attention to the duties of such authorities to safeguard outstanding areas of beauty and to stimulate and encourage the provision of facilities for increasing the number of tourists. Areas of great landscape value so far listed by the Town and Country Planning Committee of Perth and Kinross Joint County Council include the whole of the Tummel Valley. This may be taken as further proof that the Board's works harmonise with their natural surroundings.

76. Pitlochry Dam under Construction. (Courtesy H. Cook, Esq., Pitlochry).

77. The Dam, Power Station and Fish Pass, Pitlochry. (Courtesy W. Ralston Ltd., Glasgow). The large pool in the fish ladder in the foreground is one of three rest pools for ascending fish.

78. The New Aldour Bridge, Pitlochry. (Courtesy H. Cook, Esq., Pitlochry). This provides the only vehicular link between the two sides of the valley between Tummel Bridge and Ballinluig (18 miles).

79. The Old Clunie Stone Bridge across the River Tummel and the New Aluminium Footbridge now spanning the New Loch Faskally, Pitlochry. (Courtesy H. Cook, Esq., Pitlochry). The old bridge was demolished prior to inundation.

80. Faskally House and site of Clunie Power Station. (Courtesy H. Cook, Esq., Pitlochry). Nearly all the flat land between the river and Faskally House is now under water.

81. Clunie Memorial. The memorial was erected to the memory of five men who lost their lives on the construction of the Clunie Tunnel. The archway is an exact representation of the cross-section of the tunnel. Statistical data of the tunnel:- Length, 9,185 ft; Height, 22½ ft; Width, 22½ ft; Cross-sectional area, 420 sq. ft; Discharge capacity, 2,700 million gallons per day. Work began on 27th May 1946, and the power station began operating on 12th February, 1950. Construction involved the excavation of 400,000 tons of rock. The average number of men employed between 1946 and 1950 was 500, the peak employment (782) being reached in June, 1949.

82. The Queen's View, Loch Tummel, prior to the raising of the level of the loch. (Courtesy H. Cook, Esq., Pitlochry).

83. The Queen's View, Loch Tummel, after the raising of the level of the loch. (Courtesy H. Mackinven, Esq., N.O.S.H.E.B.). Under the scheme the loch level was raised 17 ft. and its length, approximately doubled.

84. The New Road by the South shore of Loch Tummel. Much of this road was re-:constructed and realigned by the Hydro Board. The photograph was taken near Netherton farm looking west. Much agricultural land - arable and grazing - was lost on this side of the glen following the extension of the loch.

85. Errochty Dam. The dam is 1,310 ft. long and 127 ft. high.

86. Work in Progress on the Errochty Dam site, (1959).

87. Loch Errochty - a General View. The capacity of the loch is 1,050 million cu. ft.

88. Fluctuations in Water Level, Loch Errochty.

89. View downstream from the Errochty Dam. The former river course (Errochty) is virtually dry. The pipe conveys water to Trinafour Power Station about one mile distant. The new access road to the dam is shown on the extreme left. Work was still in progress on the site when the photograph was taken (1959).

PHOTOGRAPHS

90. Amenity planting near Trinafour. Trees have been planted - note the netting to give protection against sheep and deer - to hide the pipe in the background.

91. Work in Progress, Trinafour Power Station (1959).

92. Entrance to the Intake Tunnel on the River Garry near Edendon, conveying water to Loch Errochty.

93. Discharge (opposite bank) of water diverted from left bank tributaries of the River Garry. The major streams affected are the Bruar, Allt a' Chreachain and Edendon.

94. Diversion of water from a small stream into the Errochty Intake.

95. The River Garry above the Errochty Intake.

96. A Rocky Memory - the River Garry below the Errochty Intake. This section of the river course only contains water during spates.

97. The Falls of Bruar. The flow is but a fraction of its former capacity.

98. The Falls of Tummel. (Courtesy H. Cook, Esq., Pitlochry). This picture taken prior to the scheme may be contrasted with Phot. 12. The average flow to-day is 54 million gallons per day compared to 600 million gallons per day before Loch Tummel was dammed.

99. Collecting Pipe opposite Dalnacardoch Lodge, Glen Garry. This pipe carrying water diverted from the Allt Culaobh to the Errochty tunnel, is visible to passing traffic on the A.9 (Great North Road) near Dalnacardoch.

100-101. New and Old Roads at Aldcharmaig, Loch Tummelside. The B8019 has been re-:aligned for about one mile at this point following the raising of Loch Tummel.

102. Bridge of Garry. This temporary bridge replaces a former stone bridge.

103-104. The "Road to the Isles". This historic routeway branches off from the B846 near Loch Eigheach which can be seen in the background.

105. Rapids on the River Gaur near Dunan. A minimum flow of 40 million gallons per day is maintained to safeguard fishings.

106. New Access Road to Loch Ericht Power Station. The road which is nearly 12 miles long rises to nearly 2,100 ft. and affords scenic vistas of the Central Highlands. Loch Ericht is seen in the middle distance.

107. Errochty Switching Station, near Tummel Bridge.

108. The "March of the Pylons", near Loch Kinardochy, south of Tummel Bridge.

109. Rannoch Power Station.

110. Tummel Power Station. Both the Rannoch and Tummel stations were built by the Grampian Company.

111. Tummel Power Station and Pipes immediately after construction (1933).

112. The Pipes conveying water to Tummel Power Station to-day (1959). The pipes are now largely hidden by birch scrub.

113. Dunalastair Aqueduct. The aqueduct was under repair when the photograph was taken (1959).

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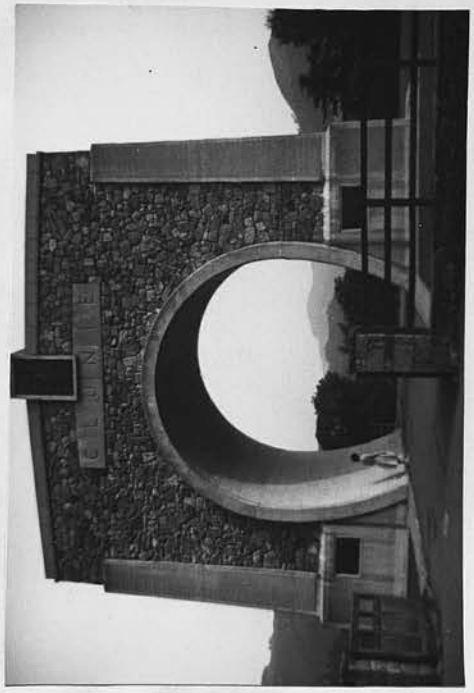

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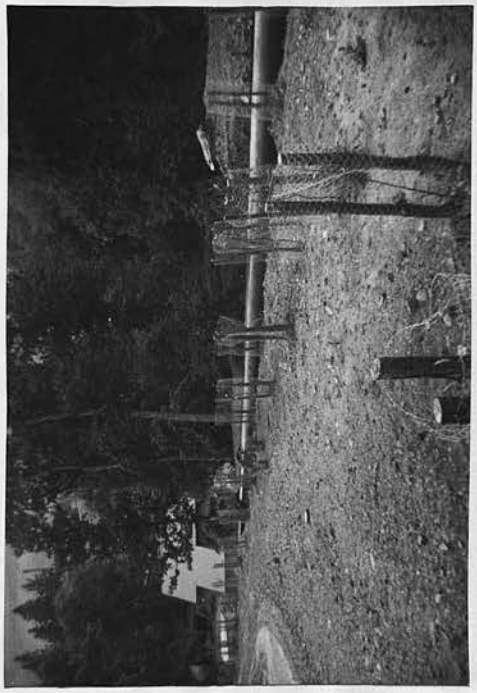

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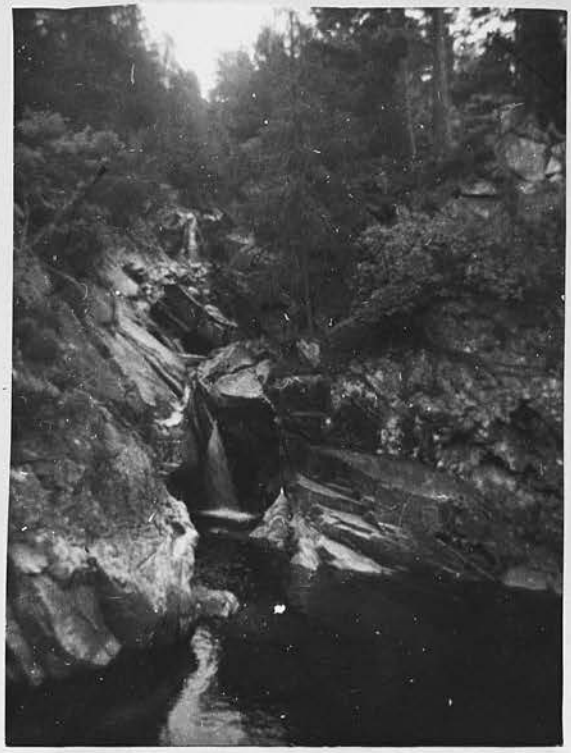

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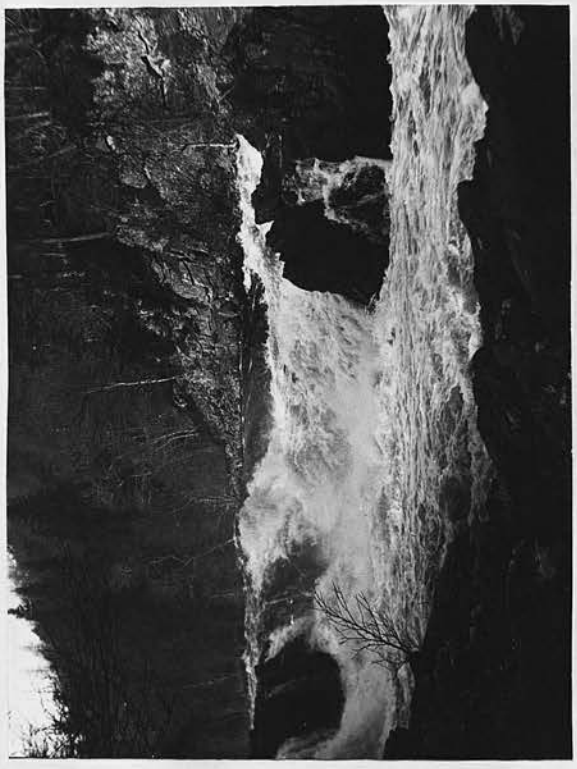

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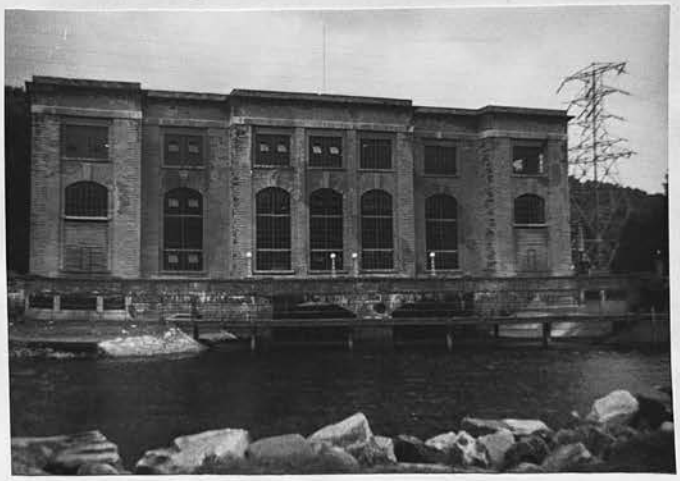

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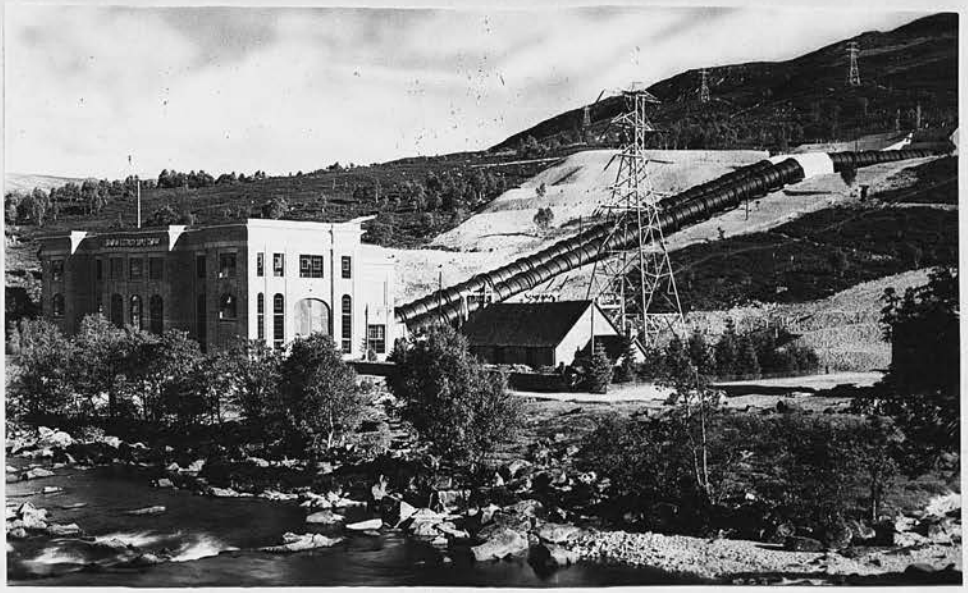

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(ii) THE EFFECT ON FISH STOCKS AND FISHINGS

The Tay, together with its many tributaries, is widely acknowledged as Scot-:land's greatest salmon river. Since hydro-electric schemes were first inaugur-:ated in the upper reaches of the river basin, notably on the Tummel and Garry, many people have felt that the schemes have already had and are continuing to have, a detrimental effect on fisheries, and in particular salmon fisheries. Re-:cently, 1961-62, the whole question of the future of salmon stocks and fisheries in Scottish waters has been further complicated by the very great increase in drift netting round our coasts, notably the east coast, where most of our greatest salmon rivers have their mouths. A ban on drift netting for salmon came into force on 15th September, 1962.

Much of the criticism levelled against the Board, including a considerable amount of correspondence in the daily press, notably in the Dundee "Courier and Advertiser" and "The Scotsman", stems from the annual publication by the Board of the number of migratory fish ascending the Pitlochry fish pass. The numbers of fish ascending the Pitlochry and Clunie passes are shown in Figs. 49A and 49B respectively.

A study of the Pitlochry figures shows a steady decline in the number of fish from 1952 to 1959, except for the year 1957, from 5790 to 3074[a], that is, a drop of approximately $2\frac{1}{2}$ thousand. Since 1959, the number has slightly increased though it still represents a decline of nearly 2000 compared to earlier years. Nevertheless, since there is a complete lack of recorded data for years prior to the commencement of the Board's operations in the area and with which recent figures could be compared, it is extremely difficult to assess with accuracy what effects the Board's works have had or are having on the fisheries of the Tummel-Tay.

In assessing the facts the writer was faced with the following problems:-

(1) The relative lack of available statistics for fishings on the Tummel-Garry.

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a 1954 was a poor spawning season due to inclement weather. Experts believe that this may have been reflected in the poor returns up the fish ladder in 1959. Conversely, reduced fishing during the war years may be reflected in salmon stocks being above average as late as 1952.

(2) A veil of secrecy surrounds certain sections of the salmon fishing industry on the Tay.

(3) The study furnished such a volume of seemingly contradictory evidence as to make it exceedingly difficult to ascertain and assess the true facts of the case.

One must bear in mind throughout this review that the Board are not required to safeguard, but rather to have regard to, fisheries on the rivers which they harness for hydro-electric generation. Let us, therefore, begin by considering the precautions taken by the Board with regard to fisheries and fish stocks in the Tummel Basin. Since the flow of water in a river is vital to the maintenance of fish stocks and to fisheries, let us commence with a study of river flows.

River Flows

Fig. 50 shows river flows at certain points on the Tummel and Garry both before and after the construction of the scheme. Here are some further notes on selected river flows.

Errochty-Garry-Tilt. The bulk of the flow above the Tummel confluence is contrib-:uted by the Tilt-Tarf. Apart from a number of small tributaries, including the now greatly diminished Bruar, the flow in the Garry between Struan and Blair Atholl (Tilt confluence) is attributable largely to the Errochty. At the con-:fluence of the Errochty and Garry, a heck[a] 114,115 has been placed across the Garry to serve two purposes; (1) to prevent spawning salmon trying to ascend the now almost dry course of the Garry,116 and (2) to induce salmon to ascend the Errochty instead. A minimum flow of 7 million gallons per day is maintained in the Errochty at Trinafour Bridge, small additions being contributed by hill burns between there and Struan. This is increased as when necessary to produce a flow at the junction of the Errochty and Garry of 10 million gallons per day between December and April, and 15 million gallons per day from May to November inclusive,

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[a] A heck is a wooden, metal, concrete or stone barrier placed across a water course. It is sometimes known as a hake.

to meet fish requirements.[b] In addition, a maximum of 500 million gallons per annum is provided as freshets at times determined by the requirements of fish.

The Tummel below Loch Tummel. The average flow down the river averages 45 million gallons per day per annum. During May to November, both months inclusive, the flow per day must never be less than 40 million gallons, while during the rest of the year, a flow to the minimum of 20 million gallons per day, must be maintained. At weekends, when there is a reduction in the amount of power generated at Clunie, the flow may average 60 million gallons per day. Further, the aggregate flow of water must not exceed 19,710 million gallons per annum. The difference in the average daily flow recorded here and that given in Fig. 50 (54 million gallons), is attributable to hill burns and in particular, to the stream which drains Glen Fincastle.

The Tummel below Loch Faskally. The flow must never fall below a minimum of 250 million gallons per day. This includes a minimum flow of 40 million - average 45 million - gallons per day per annum down the Pitlochry fish ladder.

The Gaur below the Power Station. Sufficient water is discharged to maintain a flow of not less than 40 million gallons per day per annum. This figure may only be reduced if the flow of water into the reservoir (Loch Eigheach) is less than 40 million gallons per day. The figure includes compensation water down the fish pass of 15 million gallons per day between mid-May and mid-November, and 10 million gallons per day during the rest of the year.

It ought to be understood that these flows may by necessity be increased in certain instances by overspill from the dams following heavy precipitation over the catchment basin. This is particularly true of the Pitlochry Dam which is equipped with two automatic spill-way drum gates owing to the relatively small size of Loch Faskally and to the fact that the whole of the Tummel-Garry drainage must pass through or over it.[118]

The effects of the various schemes would, therefore, seem to have been mainly

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[b] A gauge[117] to measure graphically the volume of water in the Errochty at Trinafour is maintained by the Tay District Salmon Fisheries Board.

in terms of (1) reducing the natural flows of water, and (2) evening out irregu-:larities in flows. At first glance, the reduction in flows seem to be on a scale sufficient to threaten the continuance of fish life, until one is reminded that considerable fluctuations in volume are a natural characteristic of Highland river flows.[a] Under natural conditions the rivers in question would have, undoubt-:edly, often carried water greatly in excess of that required to maintain fish, in other words, much water ran to waste serving no useful purpose, or during dry periods, too little, such as to seriously interfere with the maintenance of fish life and with the ease of passage of migratory fish like the salmon. Neverthe-:less, the determination of river flows in association with angling interests and in the interests of profitable hydro-electric generation created considerable difficulties for the Board, largely owing to the acute divergence of opinion as to the volumes of flows required along certain stretches of river to maintain fish and in particular, salmong fishings.

One may recall that the Fisheries Committee recommended that the Board's proposals for the de-watering of the Upper Garry and tributaries above Struan be abandoned. They also suggested that between Loch Tummel and Pitlochry would be ruined. Elsewhere, for instance at Loch Eigheach, they did not wish the Board to proceed with their Gaur project, but later agreed if a fish pass were built. With the exception of the Upper Garry and tributaries, where the fishing has been ruined by the water requirements of the Errochty Scheme, and where the Board are experimenting by trying to induce salmon to spawn in the Errochty to offset, at least partially, this loss, all river flows affected by the schemes have been determined through negotiation between the Board, the Fisheries Committee and the local Fishery Board.

Fish Passes

The harnessing of the Tummel through hydro-electric damming necessitated the construction of fish passes by the Board at Pitlochry,[77] Clunie and Gaur. The

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[a] Page 83

Grampian Company had earlier constructed passes at Dunalastair and also at the weir at Kinloch Rannoch. These fish passes are either of the notched, overflow weir type as at Gaur,[119], [120] or of the type with a submerged orifice between pools, as at Pitlochry. At Pitlochry (35 pools) and Clunie (43 pools), there is a rise of 18 inches between each pool. Larger pools at intervals serve as rest pools. Electronic fish counters are installed at both passes. At Dunalastair[121] there are 18 pools while at Gaur where there is a head of 92 ft., there is a final fish pass of 70 pools. At Pitlochry descending kelts are recorded photographically.

Fishery Research.

The Board have always taken an interest in brown trout fisheries and were represented on the Supervisory Committee for Brown Trout Research until 1959, when that Committee was wound up. This work is now undertaken by the Freshwater Fish-:eries Laboratory of the Scottish Home Department. The Board took a prominent part in the setting up of this research unit which is housed in a group of wooden buildings[122] next to the Forestry Commission Training School in Faskally House.

Together with the Scottish Home Department, the Conon District Fisheries Board and others interested in salmon problems, the Board are represented on the Salmon Research Committee who are responsible for the general direction and conduct of research into the respective productivity of salmon which spawn naturally and those whose ova are incubated in a hatchery, and also into the homing of fish and other related problems. This Committee normally meets two or three times annual-:ly.

Restocking of Rivers and Lochs.

At Pitlochry, the Board, in conjunction with the Tay District Salmon Fisher-:ies Board, have established a salmon hatchery inside the dam. The hatchery came into operation in November, 1959, and was established by the expenditure of part of a very generous offer of £20,000 given by the North of Scotland Hydro-Electric Board to the Tay District Salmon Fisheries Board, particularly for the extension of spawning areas to take the place of rivers destroyed, like the Upper Garry. The hatchery has accommodation for 1 million salmon eggs. In impressive airy

comfort set amidst scores of bright lights, are 48 asbestos cement troughs con-:taining 246 egg-holding plastic trays. An even diffused flow of water filter-:ed from Loch Faskally passes through the troughs. Fish caught and taken from a trap near the tailrace of the Lubreoch Dam in Glen Lyon, are stripped of their eggs which in turn are transported in special containers to Pitlochry. More eggs are stripped from salmon taken from the Garry near Struan. Incidentally, a female salmon carries between 500 and 600 ova for each pound of her weight.[a] Each spring eyed ova and fry from Pitlochry are distributed to the tributaries of the Upper Tay and Tummel.[b] One of the great benefits of the hatchery is that the young fish are free from frost, drought, flood and the many predators to which they would be open to attack in natural conditions. Their chances of survival are thereby greatly increased, at least until they are distributed.

In addition, in order to maintain and improve the stock of brown trout in Loch Faskally, the Board planted the following numbers of yearling trout in the loch for the years 1957-59. These trout which were planted in the spring were purchased from commercial hatcheries.

Loch Faskally

Year	Number of Trout
1957	2,000
1958	12,000
1959	5,000

The Scheme and its Effects

Having broadly discussed the precautions taken by the North of Scotland Hydro-Electric Board with regard to both salmon and brown trout fisheries, let us now consider their effects.

River Flows

On good authority it was learned that the natural course followed by the

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a Following recent research into the spawn-bearing of salmon in six Scottish rivers, it is now possible for anyone who knows the lengths of female salmon going up river to spawn, to estimate fairly accurately the number of eggs these fish will lay. The results of the inquiry are expressed in terms of a single formula which can be applied to all salmon ascending rivers to spawn.

b In 1961, 37,000 parr, most of which were fin clipped or tagged for future iden-:tification, were placed in Loch Tummel.

majority of ascending fish on having reached Loch Faskally, was to follow the Garry rather than the Tummel. This may in turn be attributed to:-

(a) The Falls of Tummel are a natural barrier which for long have been known to create difficulty for migratory fish. To overcome this, a fish pass was con-:structed in 1910 by blasting a passageway through neighbouring rocks to circum-:vent the falls.[123] The success of this operation was, however, open to debate.

(b) A fair proportion of the course of the Tummel is taken up by lochs which are not conducive to the spawning of salmon.

(c) Until one reaches Rannoch, the Tummel has no large tributaries. This may have played an indeterminate part in rendering the Tummel less effective as a salmon river.

(d) There are no lochs on the Garry and tributaries with the exception of the relatively small Loch Garry. In addition, the Garry has a number of large tributaries, notably the Tilt, within a relatively short distance of its confluence with the Tummel. The even profile of the Garry is conducive to fish movement. This may be contrasted with the stepped profile of the Tummel.[a]

The sum total of these arguments has resulted in a conservative estimate that only 6% of the salmon which pass Faskally go up the Tummel Valley to spawn. This figure would seem further substantiated by comparison of the numbers of fish ascending the Pitlochry and Clunie fish passes.

On first consideration in the light of what has just been said, one might be excused for thinking that the diversion of water from the Upper Garry and tributaries on the scale with which this has been done, would have largely destroy-:ed the Garry Basin as a future spawning ground for salmon. But this is in practice far from being the case. For reasons not yet fully understood, a con-:siderable proportion, probably well in excess of half, of the salmon ascending the Garry turn right at Blair Atholl to spawn in the Tilt river system which fortunately remains unaffected by the Board's schemes. The flow of water in the Garry is such as to make access to the Tilt for fish readily available. But what

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[a] Fig. 46

of the remainder of the Garry Basin? What of river flows, the heck at Struan and the Board's experiments for the Errochty?

With regard to the last of these it is as yet too early to draw a conclusion but here are some criticisms concerning the others which are considered valid.

Firstly, the heck is considered satisfactory during normal weather conditions when the de-watered Garry is almost dry. But after heavy and prolonged rain it leaves much to be desired. For instance, on 9th August 1961, after two days of torrential rain, the Garry was in spate[a], such that at Struan, its volume was several, if not many times, the volume of the now controlled Errochty. Consequent-:ly, many fish may have ascended the former river only to be trapped and thereby lost when the river reverted to its normal dry course. Changes in the present design of the heck are required if the heck is to be an effective barrier to fish both during high and low water. A high heck in the form of a grid would be effective in stopping fish but, of course, would tend to create an obstacle to logs, branches of trees and other flotsam borne along by the floodwaters. Per-:haps a higher, sloping wall barrier across the river in place of the present low one would be a solution. In mormal circumstances the flow of water over such a barrier would be insufficient to accommodate fish while, during spates, the flow would be of sufficient strength and speed to deter most, if not all, fish. These are but suggestions and should not be taken as necessarily providing an effective solution to the problem.

Secondly, while the flow in the Errochty may be considered as sufficient, this flow when spread over the much wider course of the Garry below Struan seems pitifully small. Not only has this seriously curtailed the number of spawning redds between Struan and Blair Atholl but it cannot be conducive to the effective conclusion of the Board's plans for the Errochty. To improve matters an increased flow from the Errochty Dam - failing any changes being made in current flows in the Garry above Struan - in addition to the freshets earlier referred to, would be desirable.

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[a] Caused primarily by overspill from the weir at Edendon.

Thirdly, there is evidence that the scheme has adversely affected angling below Blair Atholl. For example, only two salmon were caught on the Urrard beat between 1957 and 1961. Other beats also reported poor returns. The number of brown trout caught has also declined, the reason suggested being the semi-permanent low level of the river.

While it is as yet too early to pass any final judgement on the success of the Board's experiment to induce salmon to spawn in the Errochty in place of the Garry, there would appear grounds for quiet optimism. Many thousands of eyed-ova and fry have been planted in both the Errochty and Tilt. Similar experiments abroad have been eminently successful. For example, in Sweden, where intensive logging operations make it impracticable to build fish passes, the Swedes have adopted the system of trapping spawning salmon as they enter the river estuaries, stripping them of their eggs and rearing the young fish in hatcheries. These are then placed in the lower reaches of the rivers from whence they may return to the sea.

Experiments on the River Indalsalven have been particularly successful. Here the natural spawning grounds had been ruined by a series of dams and artificially created lakes and consequently, the river had to be stocked from hatcheries. Before the commencement of hydro-electric operations on the river, the best annual catch was in the region of 8,000 fish. Since the introduction of the conservation scheme, the total annual catch has not only recovered but increased. In 1960, the catch was 10,000 fish, an increase of 257 over pre-hydro days.

It was estimated at the time of construction that the de-watering of the Upper Garry and tributaries would entail a drop of about 2,000 fish in the number of salmon spawning in the Garry Basin. This would appear to have been borne out as may be deduced from a study of the figures relating to the number of fish ascending the Pitlochry fish pass over the past decade. Yet any accurate assessment of the effects of the scheme can only be made if all other relevant factors in the basin of the Tummel-Tay remain equal, including the intensity of both rod

fishings and in commercial netting in the lower reaches of the river and sea beyond. There is strong evidence to suggest that both rod and commercial nett-:ing, particularly the latter, have greatly increased in recent years. These alone could seriously interfere with the natural salmon run of the river. As the reader will have increasingly become aware, any assessment of the effects of hydro-electric schemes on the fishings of the Tummel-Tay, particularly in view of available statistics, can be a difficult and exacting task.

Let us return to the Tummel Valley. Unlike the Garry, no major river, with the exception of the relatively short course of the River Ericht, has been entire-:ly de-watered. Instead, flows have suffered diminution to varying degrees or sections of former river courses have been submerged through damming. The follow-:ing are notable consequent effects.

The creation of new or the extension of former lochs has destroyed an inde-:terminate number of natural spawning redds. Undoubtedly this would, through time, have serious consequences on salmon stocks in the Tummel and may in part have been responsible for the decline in fish as noted in Figs. 49A and 49B. Already the Board have carried through a considerable re-stocking of rivers and lochs in the Tummel Valley, the effects of which should become apparent over the next few years. There is a growing body of opinion that this cannot but ulti-:mately have beneficial results and will perhaps offset the noticeable decline there has been in salmon fishings in the area in recent years.

Much complaint was voiced by riparian owners and anglers with regard to rod fishing. General opinion was that catches had declined and this particular-:ly so, downstream from Loch Tummel. Fig. 51 refers to the number of fish caught on a beat below the Clunie Dam both before and since hydro-electric opera-:tions commenced. It is noticeable that returns have declined since the scheme began operating. Yet immediately below the Pitlochry Dam it is maintained that fishing returns are as good to-day as previously and that there were good and bad years then as now. For example, records show that while 1943 and 1944 were good years, 1945 and 1946 were poor years - only 3 salmon being caught during

the whole of the latter season. This spring (1962) was notable for record catches. On one day 3 rods landed 9 salmon varying from 7 lbs. to 22 lbs. On the same day hundreds of salmon were reported in this stretch of river.

A little further downstream fishings were once more described as poor. One owner claimed that where he had previously taken an average of 80-90 fish per annum, he had this year (mid-August, 1959) taken only 9 fish. He maintained that there had been a marked decline in returns since the Board commenced operations.

Overall there would seem to have been a decline in fishings on the River Tummel and particularly in those stretches of the river most directly affected by the Board's schemes, for example, between Clunie Dam and Loch Faskally. There was almost unanimous belief among owners and anglers that angling had been literally ruined through (1) the artificial rise and fall in the level of the river due to the fluctuating needs of power generation, and (2) the semi-permanent low level of the river along certain stretches, notably between Clunie and Loch Faskally. It is claimed that the former has the effect of disturbing salmon, there being no time for the fish to settle in the pools before the next artificial spate moves them on up-river. Being unsettled, fish are unwilling to rise to the fly and therefore the chances of a good day's sport are remote. With regard to diminished flows it is commonly held that low water, whether natural or artificial, is not conducive to angling and thus the semi-permanent low level of the river along certain stretches will have seriously interfered with and curtailed angling on these beats. This may be the main reason why the overall number of rods fishing on the river has declined since the scheme commenced - this is a widely held belief - which may in turn, at least partially, account for the decreases in the returns given in Figs. 51 and 52 over the same period.

There is abundant evidence to suggest that the Pitlochry Dam contributes little to "ironing out" the daily rise and fall in the Tummel-Tay as a consequence of hydro-electric generation - except in mid-summer when less power is generated - as was originally claimed. Yet whereas the fluctuations in flows in general

detracts from angling, they are beneficial to fishings immediately below the dam. There is strong evidence to suggest that salmon are drawn upstream by the artificial spates to congregate below the dam before ascending the fish ladder.

It was suggested by the owner of a beat some distance below Pitlochry that fluctuations in the river level induced salmon to spawn on stretches of gravel in braided channels of the river which were later left high and dry when the river reverted to normal. The writer was, however, unable to substantiate this statement although it seems feasible that such may occur on occasions. Similar occurrences can, of course, follow a natural spate.

With regard to trout fishings, trout now seem to be doing much more bottom feeding as a consequence of the artificial rise and fall of the river and show less inclination to rise for flies. It may be that the unnatural rise and fall in the water level has a detrimental effect on insect life in the river.

Further downstream on the Tay at Caputh, Dunkeld and Stanley, the daily rise and fall in the river level is a sore point among riparian owners, ghillies, boatmen and anglers. At Murthly (near Caputh), for instance, the increased flow from the early morning generation at Pitlochry is first noticeable about 10.30 a.m. One is aware of the rise whether one is wading or in a boat. The rise of approximately 1 ft. has a disturbing effect on the fish in the pools, so much so that they immediately become restless and start moving upstream. Fish coming to take their place from lower beats are also restless and thus angling is made more difficult.[a] In consequence it was not surprising to find that many maintained that catches were not what they were before.

It is somewhat unfortunate that the main salmon run on the Tummel-Tay takes place during the spring when the river is subject to this daily rise and fall and not in summer when, as may be checked by any of the river gauges, this artificial fluctuation is virtually non-existent. From the Board's records at the Pitlochry

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[a] One compliment paid in favour of the daily rise and fall of the river is that during hard winter weather, it helps to keep the water fairly free of ice grue which on many other rivers seriously interferes with fishing.

fish pass, a conservative estimate would place the spring run of fish at about $1\frac{1}{2}$ times that of the summer run. Approximately $2\text{-}2\frac{1}{2}$ thousand fish ascend in spring, $1\text{-}1\frac{1}{2}$ thousand in summer and the remainder, about 500, in autumn.

So far from what has been written there is evidence to suggest that the diminished flows and artificial fluctuations in river levels consequent on hydro-electric generation, have had a detrimental effect on rod fishings and returns, though not necessarily on fish life except in the now dry Upper Garry and tribu-:taries. No final conclusion can, however, be drawn until other relevant factors have been considered and discussed.

Fish Passes

Many believe that the fish passes between Pitlochry and Gaur are inadequate for the safety and ease of passage of migratory fish especially those returning to the sea. The apparent reduction in the number of salmon ascending the Pit-:lochry pass in recent years is taken as evidence of the gross inadequacy of fish passes in general. But is this a just criticism?

Asked to comment on the adequacy of the Pitlochry pass, Mr K.M. Pyefinch, Director of the Freshwater Fisheries Laboratory at Faskally, said "We just don't know statistically what salmon runs were before. We don't know whether the number of fish ascending the Pitlochry fish pass to-day is 90% or 9% of the num-:ber in pre-hydro days."

It is true that a count was taken on the Tummel for certain years following the construction in 1910 of the fish pass[123] to by-pass the Falls of Tummel, but since this count depended solely on what could be seen by the eye and was not a 24 hour service for each day salmon were running in the river, it is quite imposs-:ible to make any real comparison between these figures and those at Clunie and Pitlochry taken by the Board.

A description has been given elsewhere[a] of the types of passes used on the Tummel. Since all have been in operation since 1953, there are none of the latest Borland type.[b] Let us pause for a moment to consider how effective the

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[a] Page 294

[b] See under Strathfarrar-Kilmorack Scheme, page 178

present passes have proved with regard to the passage of fish upstream.

The Board have spent a great deal of time, research and money on fish pass design throughout the Highlands. At Pitlochry, for instance, there are three rest pools[77] in addition to the normal pools in the ladder. Water passing through the connecting pipes between the pools is controlled at a speed of 1 ft. per second, which is no faster than may be encountered over natural falls and rapids. This would seem to suggest that the pass should be at least as suitable for the passage of ascending fish as the former rather rocky, rushing course of the river at this point. Yet despite the care taken in designing the pass, fish do tend to gather in the river below the dam and remain there for some time before ascend-:ing the ladder. This would seem a reason why the fishing to be had on this beat of the river seems as good as if not better than pre-hydro days.[a] But why should there be a time-lag? The cause may be largely for two reasons. Firstly, the fish may be attracted to the main current of water passing through the tail-:race of the dam. Although the fish are screened from entering the tailrace and some time may elapse as they mill around before finding the smaller flow of water issuing from, and the entrance to, the foot of the ladder, the length of time lag will naturally vary considerably from one fish to the next. Secondly, it is known that changes in the oxygen content of river water do have an effect on the behaviour of ascending salmon. Spring salmon have a distinct dislike for water with a high oxygen content which may follow both from agitation of the water and from low temperature. In winter and spring the temperature of the water issuing from a reservoir such as Faskally, will be lower than in a normal river course and hence its oxygen content will be higher. This may be further increased by the considerable agitation which takes place as the water passes from pool to pool.

Of course, even a natural fall in a river course will create a time-lag. What is difficult to prove and which so far as is known to the writer has not yet been effectively proved, is whether the time-lag is greater than before and

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[a] Page 299

and whether it has had any direct bearing on the decline in the number of fish ascending the pass over recent years. It may be pointed out here that the height of the dam is thought to be of little consequence. Salmon are delayed on average about 12 hours for every 100 ft. of vertical climb and since the dam at Pitlochry is only 54 ft., the delay here would be only a little over 6 hours. Even at Gaur which creates the greatest barrier (92 ft.) in the whole valley, the delay would be only about half a day. It is of interest to note that despite what has been written about the apparent time-lag at Pitlochry, the Tay District Salmon Fisheries Board consider the pass adequate. Similar satisfaction has been expressed with fish passes elsewhere in the Basin. Finally, it is pleasing to note that the Grampian Company were complimented on the design of their fish pass in 1934 in the 53rd Annual Report of the Fishery Board for Scotland:-

"It is now pleasing to report that during the past season when the whole of the arrangements were working under normal conditions, salmon freely ascended past the dam which is approximately 30 ft. high.[a] It was feared that some diffi-:culty might be experienced in inducing the fish to leave the very large flow of water at the tailrace, but they have taken full advantage of the passage upstream and no accumulation of fish has resulted either below the power house or below the dam. It is reported that the number of fish spawning above Loch Rannoch, all of which must have gone through the Dunalastair pass, is larger than for a number of years past."

To probe into the effectiveness of the various dams and fish passes in the Tummel Basin with regard to the passage of ascending fish lies outwith the realms of this thesis but at Dunalastair, the relatively shallow water of the reservoir (higher temperature and lower oxygen content), the shorter fish ladder (less agitation of the water) and the position of the outlet of the fish ladder in rela-:tion to the larger flow issuing from the tailrace, may be factors favouring the relative ease with which fish are thought to navigate this dam. May it suffice to say in summing up that there seems truth in the assertion that the creation of dams may tend to retard the passage of fish upstream for the reasons stated

[a] Dunalastair Dam

and perhaps also for reasons yet unknown, but that this does not adversely reflect on the steps taken by the Board to safeguard the passage of fish by reason of the fact that the passes are at present considered adequate for the passage of fish and for the future maintenance of fish stocks by the local Fisheries Board.

What of the safe return of smolts and kelts? Can fish descend the ladders easily and without damage? Apparently there is still a body of opinion as yet unconvinced that hydro-electric generation is or can be compatible with the safe return of smolts and kelts. The following is an extract from a letter to the editor of the Dundee "Courier and Advertiser", 18th May 1959, by a well-known local angler on the subject.

"The construction of the dam at Pitlochry, so far as the free access and egress of salmon kelts and smolts, was grossly inadequate for the safe and speedy downward passage of kelts and smolts - these are the very life blood of your river fishing."

"I believe modifications and improvements are being or have been made, but stories of smolts churned up in the turbines are, I am afraid, all too true - but information is difficult to get, and I have never seen any authoritative statement on the position at Faskally Dam: such news would be welcomed."

In his accusation that "smolts are churned up in the turbines", he is ably supported by this extract from a letter which appeared in the correspondence columns of "The Scotsman", 4th November, 1960.

" ... Secondly, even where the river has not been spoiled by having the major part of its flow abstracted, millions of smolts are killed every year as they descend the river by going through the turbines."

On what grounds do these "learned" gentlemen base their arguments? Cer-:tainly not on fact. Let us consider the facts. There is abundant evidence to the contrary. A report concerning the passage of smolts and kelts through fish passes was drawn up in 1957 by an independent committee of inquiry,[227] while both the Tay District Salmon Fisheries Board and the fishery research staff at Faskally have conducted numerous experiments into the problem.

Smolts. Where there is no screening, the bulk of smolts pass through the tur-:bine intake of the dams and so out through the tailrace into the river beyond. This happens, for example, at Pitlochry. The blades have a clearance of 3 ft. 9 ins. and netting carried out below the dam, has shown that no smolts are

injured by passage through the turbines.[a] This has been done to the satisfaction of the Chairman of the Tay District Salmon Fisheries Board.

At Clunie, Dunalastair and Gaur,[124] where the turbine intakes are screened, all smolts must by necessity pass down the fish ladders. The position at Dunalas-:tair was not considered very satisfactory until 1952 but since then, improvements, including the provision of new smolt pools, have greatly helped matters and the current position is now accepted as being satisfactory.

Experiments carried out by research staff at Faskally into the passage of smolts through turbines, have shown encouraging results. In spite of dangers from turbine blades, changes in water pressure and the fact that fish may be drawn through the tailrace gratings at enormous speeds, it was possible for smolts to survive drops of up to 120 ft. through intake tunnels and turbines, that is, well over twice the head at the Pitlochry Dam and a greater drop than occurs at any dam in the Tummel Valley.

Research has shown, however, that while fish ladders have proved successful for the egress of smolts, there is the danger where turbine intakes are screened, for young fish to gather round the screens where they are open to attack by cannibal trout and other predators.[b] At Clunie there is a 50 yard long grid with 2 inches between the grid and this has proved of great benefit in allowing smolts to escape predators before making their way down the ladder, the entrance to which is a pipe 18 inches in diameter in the side of the dam and through which the velocity of the water is controlled at a maximum of 1 ft. per second.

There is thus little evidence to fear for the future salmon stocks of the Tummel-Tay through damage to smolts from hydro-electric schemes. It ought to be remembered that the study of salmon migration in our rivers is still in its infancy and that consequently, since experience is still limited, the steps taken to

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[a] The Galloway Scheme has been cited as evidence that smolts need not suffer from hydro-electric generation and that the rivers still carry a good stock of salmon after 20 years.

[b] Cannibal trout are considered a danger to smolts. Pike and perch are not con-:sidered of much consequence as they are too slow to readily catch the slick moving smolts.

ensure the safety of returning smolts show remarkable ingenuity and regard for fish conservation on the part of the North of Scotland Hydro-Electric Board. It is suggested, however, that the Board make more widely known to the public at large, the steps taken by them to ensure the safe return of smolts and the re-:sults so far attained.

Kelts

Hydro-electric development has created new problems for descending kelts because of the long impoundments which are often deepest at their downstream end and because the greater part of the natural flow passes through the turbines from which kelts are screened. Difficulties may also be raised by differences in dam design. For instance, the entrance to a fish ladder may be at some distance from the turbine intake, at right angles or parallel to it, or at the opposite side of the dam, as at Dunalastair, the position of the entrance to the ladder may be such that the fish may miss it or the suction effect caused by the greatly accelerating water at the mouth of the entrance may cause the fish to swim against the current and away from it, in other words, the fish may show reluctance to enter the pipe.

Similarly, kelts may be attracted by the increased acceleration of the water in front of the entrance to the turbine intake. Naturally, all such tunnels are screened to prevent anything the size of kelts from entering, but this does not detract from the fact that the flow of water at such points may attract the fish and hinder their descent via the fish ladder. At Clunie, the only entrance for kelts to the ladder is a pipe 3 ft. in diameter in the side of the dam. At Pit-:lochry which spills when the sluice gates are open, most kelts actually pass over the dam with, it is assured, no apparent damage to the fish. Consequently, the ratio of descending kelts to ascending fish is much less at Pitlochry than at Clunie[a], as no record is possible of kelts passing over the Pitlochry dam.

Since it is reckoned that only about 5% of kelts ever reach the sea to return and spawn a second time in Scottish rivers, the safe return of kelts to the sea is not considered of importance with regard to the maintenance of salmon stocks. Un-:doubtedly, fault could be found with the entrances to some of the fish ladders

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[a] Figs. 53A and 53B

which seem either too small or rather wrongly located to induce kelts to find and use them easily, but for the reasons stated in the previous sentence and as was suggested in a recent Report,[227] "there is obviously a limit to the money and effort which it is worth devoting to the descent of kelts," and hence this is of little consequence.

The reluctance of kelts to use the ladders seems to be expressed by the fact that whereas, previously, April was the peak spring month for the descent of kelts at Pitlochry, the peak is now reached in May, while many may not make the descent until June or even July. This may also be attributable to the accumulation of kelts in the deep waters of the new dams and to the low temperatures of the deep, impounded waters which have a slowing effect on the movements of fish. Again there has been evidence of late that the Tay is slowly reverting from a spring to an autumn river[a] as it formerly was 60-70 years ago. It is suggested that the delay in the return of kelts consequent on hydro-electric damming may be a contributory cause.

To conclude, the precautions taken by the Board to ensure the safe return of kelts must be considered as satisfactory despite the delay in the timing of this return. There is no evidence of any decline in the number of kelts since the schemes came into operation.

Loch Fishings

The accompanying tables show the catches in recent years on Lochs Faskally and Eigheach on which the Board lease fishings.

Loch Faskally

	Fish Caught	
Year	Number	Weight (lbs)
1957	95	109
1958	241	67¾
1959	114	85
1960	120	90

Loch Eigheach

	Fish Caught	
Year	Number	Weight (lbs)
1957	1029	486
1958	1356	634¼
1959	983	395½

a This means that the main run of salmon is now tending to take place in autumn rather than in spring.

No records are available of the number of rods fishing annually in each loch but it seems certain that Faskally, owing to its location beside Pitlochry, would be the more intensively fished. Again, Faskally has been stocked with thousands of yearling trout in recent years. It is thus surprising that Faskally shows a disappointing return in comparison with Eigheach. Are there any apparent reasons for this?

A number of people who claimed to know the fishings on Faskally well suggested that the lack of good fishing shallows was to blame. The sides of the valley are such that the loch is deep for its size and its banks slope very steeply. This may be contrasted with Eigheach where the banks are much less steep and the exten-:sion of the natural loch by damming has created extensive shallows at the western end. Nevertheless, there are plenty fish in Faskally and it is known to contain many large ones. It is thought that the unnatural conditions following the construction of a dam has resulted in a faster speed of growth among fish. As proof of this, one of the staff at the Freshwater Fisheries Laboratory at Faskally caught a trout weighing 17 lbs $7\frac{3}{4}$ ozs. on the loch. This giant fish which was 5 years old when the dam was constructed, weighed only $\frac{1}{4}$ oz. less than the British record. Again, if one compares the average weights of all fish caught in both lochs for the years shown, the weight per trout at Faskally is 0.62 lbs. while at Eigheach it is only 0.44 lbs, and this despite the large amount of stocking in the former. Might not this rapid growth in the size of trout be due to canni-:balism?[a] For this reason there is a considerable body of opinion that the Board's efforts to re-stock Faskally is a waste of time and effort.

Yet if one is acquaint with Faskally apparently some good fishing may be had. In consequence of its small size and wooded banks, the loch has the advantage of being sheltered from wind, so often a hazard on other lochs. Although many fish may be seen moving in the tailrace of the Clunie Power Station, the best fishings are to be had between the boathouse and the Big Stane, a quarter of a mile beyond.

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[a]One fish caught just below the Pitlochry dam by the proprietor of the Pine Trees Hotel, weighed $4\frac{1}{2}$ lbs and was full of parr.

This was a good stretch before the dam was constructed and it seems probable that salmon still follow the original course of the river. For similar reasons, good fishings may be had beyond the Tummel confluence.

An interesting feature about salmon fishing on Loch Faskally is that fishing is forbidden until 300 salmon have passed the recorder in the fish ladder and so into the loch. In this respect the loch is unique, being the only water in Britain where the fish have a "say" about the opening date of the fishing season.

The Tay District Upper Proprietors' Salmon Fishing Association.

This association came into being in 1959 with the view of protecting, and where possible improving, the stocks of salmon and sea trout in the Tay, its tributaries and associated lochs. Within a year of inauguration there were 62 members and 12 associate members.

While no figures were available for rod catches of salmon and sea trout on the Tummel alone, the writer was successful in obtaining statistics for the whole of the Tay Basin for the years 1952-58.[a]

Commenting on these figures, a spokesman for the Association suggested that more efficient methods of fishing probably accounted for the increase over the years stated, although a slight increase in fish stocks could not be ruled out. One of the first duties of the Association had been to collect records of fishings - some extending as far back as 50 years - and to try and establish facts with re-:gard to trends in the river as a whole. These showed that despite the pessimism expressed by some, rod catches had increased on many beats in recent years. Un-:fortunately, these records are not open to the public and hence the writer was unable to ascertain with accuracy which beats had experienced increased returns. The Association were willing to concede, however, that certain beats on the Tummel and Tay had been considerably incommoded by fluctuating levels in river flows but that this did not necessarily mean, in the majority of cases, that fish could not be caught. Rather did it make angling more difficult.

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[a] Fig.55

The Association believed that people were too readily inclined to belabour the North of Scotland Hydro-Electric Board when poor returns were experienced. They believed that occasionally excessive amounts of water were discharged by the Board's works which greatly disturbed rod fishings and for which there was no need to happen as there was agreement between the Hydro Board and River Board as to the discharge of such freshets. On the other hand, the Association expressed praise for the efforts undertaken by the Hydro Board to safeguard both fish and fishings and warmly complimented them on the re-stocking they had carried out in rivers and lochs affected by their schemes. The Association suggested that the Board's re-stocking was beginning to have effect although it was as yet too early to draw any firm conclusions. While they deprecated the disruptions caused to fishing by the Board's works, they did not consider the fishings permanently ruined anywhere, except in cases such as the Garry. Admittedly some beats, as on the Tummel, had gone back, but others had experienced an increase in returns. Satisfaction was expressed for the new salmon hatchery at Pitlochry although the Tay District Salmon Fisheries Board had been slow to make use of the £20,000 offered to them by the Hydro Board for the improvement of fishings.

To conclude, from a study of the records now in their possession, there was no evidence of any overall decline in fishings in the Tay District as a whole since the advent of hydro-electric generation in the area. Since this was so, despite the loss of much of the Garry and parts of the Tummel and other tributaries for spawning, either through de-watering or submergence by damming, they could only assume that the efforts being made by the Board to counteract these losses were being successful.

It was learned in the course of discussion that the Upper Proprietors' Association viewed the commercial netting on the lower reaches of the Tay as a much greater threat to the maintenance of salmon stocks than the works of the Hydro Board. Apparently the netters are under no compulsion to divulge the numbers of fish caught in their nets to anyone other than the Secretary of State. Consequently, not even the River Board who is responsible for the administration

of the river and presumably for its preservation and betterment which would include fish stocks, have any knowledge of the number of fish being taken by the nets except after a lapse of ten years.[a] If, as seems apparent, the number of fish being caught by the nets has been increasing lately, as may be deduced from an examination of the profits and dividends paid to the shareholders of the Tay Salmon Fisheries Company, the Upper Proprietors' concern for the Tay salmon seems justified. Recently,[b] a Committee on Scottish Salmon and Trout Fisheries (the Hunter Committee) was formed by the Government to hear evidence, review the Scottish salmon fishing laws and to submit recommendations, as to what extent salmon fishings should be regulated. On the grounds of fish conservation alone, it is to be hoped that the Committee recommend that something positive may be done to bring our archaic salmon laws up-to-date. In view of the value of our salmon fisheries, it is also hoped that something may be done to preserve a reasonable yield of fish between all fishing interests - riparian owners, netters and anglers.

Fisheries and the Economy

Despite the publicity given to the view that fishings have suffered as a result of hydro-electric generation and/or excessive netting, the fact remains that fishings are in greater demand to-day than ever before. Beats on the Tummel-Garry and Tay, with a few notable exceptions on the former, and their associated lochs, remain an attraction for anglers from all over Britain. No statistics are readily available as to the number of anglers but it is an established fact that one has literally to queue nowadays to obtain the right to fish. The growth of the affluent society and the mobility of the motor car have brought angling within the means and reach of an ever increasing number of people.

The creation of the new loch at Faskally has contributed to the popularity of Pitlochry as an angling centre. Whatever the merits of the Board's stocking policy in the loch and the difficulties created by the lack of shallows, boats

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[a] "... such statistics shall not be published in any form as to disclose the actual numbers of salmon caught in any one fishery within the period of ten years preceding such publication." (The Salmon and Freshwater Fisheries Protection (Scotland) Act, 1951).

[b] March, 1962

are seldom empty during the season. No doubt its sylvan setting and accessibil-:ity are factors favouring the popularity of the loch.

Rod fishings bring a considerable trade to hotels, shops and garages and benefit the whole tourist industry enormously. It is reckoned that taking the Tay Basin as a whole, every rod-caught fish results in about £5 worth of local trade and employment, the corresponding figure for every net-caught fish being about 10/-.

The number of men employed both whole-time and part-time by the proprietors of fishing beats is reckoned to be considerably in excess of those employed on the nets. Unfortunately, there are no readily available records as to the numbers employed in either rod or net fishings, but it is apparent that were there any decline particularly in the salmon industry, whatever the cause, the loss in general trade and employment and to tourism would have serious repercussions on the whole economy of the basin.

Summary and Conclusion.

While records show that there has been no overall decline in fishing returns in the Tay Basin as a whole, certain beats on the Tummel-Garry show a decline which can be traced to the harnessing of the rivers in question for hydro-electric gener-:ation. The suggested causes are primarily as a direct or indirect result of:-

(1) A reduction in the volume of river flows - most effective in the case of the Garry.

(2) A fluctuation in the volume of flows consequential on the varying requirements of turbine operation.

While deprecating the effects of the rise and fall of the river on fishings, the writer is at a loss to suggest an adequate solution to the problem in view of the small size of the Faskally reservoir and the fact that a number of stations within the basin are designed to meet peak load demand which entails the use and discharge of large volumes of water. Instead, it is suggested that this is a problem which ought to be viewed objectively and that since the schemes in the Tummel Basin are major revenue earners for the Board, it is in the public interest

that the requirements of hydro-electric generation should have preference over any loss and/or inconvenience entailed by fishings on the river and which though of local significance, are of less consequence in relation to the basin as a whole. Nevertheless, the Board should on their part take every precaution - there is a suggestion that this is not always done - to curb the release of excessive water into the river as far as is possible and practicable.

The Board have taken steps to make good by various means any losses caused or thought to have been caused by their schemes. These include:-

(1) Experiments to adapt the River Errochty as a major spawning stream in place of the now dry Garry.

(2) The re-stocking of major rivers, tributaries and lochs with eyed ova and fry.

(3) The generous offer of £20,000 to the Tay District Salmon Fisheries Board for expenditure on schemes to improve fishings. These include the hatchery within the Pitlochry dam and the blasting of obstacles so as to enable fish to ascend rivers more easily and so open up new spawning grounds to take the place of those lost in consequence of hydro-electric generation.

(4) The time and effort taken by the Board to ensure as far as practicable the free access and egress of migratory fish.

(5) The prominent interest shown by the Board into problems concerning salmon and brown trout research.

This brings us to a final consideration and assessment of Figs. 49A and 49B, the statistics of which have been a source of considerable controversy and much bitter criticism of the Board. In attempting to draw up a constructive assessment of the problem, it is the writer's wish that the reader first consider the following facts some of which are stated elsewhere in this report.

(1) In 1945, the Tribunal of Inquiry reached the decision that it was in the public interest that the scheme be allowed to go through and that any damage to fisheries was insufficient to bar it. This decision was reached despite the fact that it was known the de-watering of the Upper Garry and tributaries and the impounding of new lochs, would curtail existing spawning grounds and

so lead to an eventual decline in salmon stocks. An arbitrary figure of 2,000 fish was mentioned.

(2) There is no accurate assessment of what salmon stocks were in the Tummel Basin prior to the construction of hydro schemes.

(3) It is known that the stock of salmon in a river is subject to considerable fluctu-:ation, that is, cycles or years of plenty alternate with periods when stocks are low, for reasons not yet fully understood.

(4) In consequence of the statements in (2) and (3), it is unwise to take the statis-:tics shown in Figs. 49A and 49B at other than their face value. Certainly, while the effects of the loss of the Upper Garry, etc., will be reflected in the decline in the numbers of salmon ascending the Pitlochry fish pass over the period, 1952-61, this decrease cannot be entirely corollated with the effects of the scheme. Further, the years shown only cover a maximum period of 10 years. The effects of the suggestions given in Note (a) at the foot of page 290 lead to further compli-:cations.

(5) There is no evidence to suggest that fish ladders radically interfere with the ascent or egress of migratory fish although they may be responsible for certain modifications, particularly in the timing of salmon runs.

(6) The Board, fully realising the effects their schemes might have on fisheries, particularly through de-watering and the impounding of river flows, have adopted various means (summarised on the previous page) to make good any losses which might be construed as having followed from the construction of their schemes. While it is perhaps too early to confirm with what success their efforts have had, there is no evidence, judging from fish catches made in the Tay Basin as a whole and this despite hydro schemes additional to those on the Tummel-Garry, to suggest that overall catches have declined.

These facts, together with evidence submitted by local anglers and owners of fishing beats, has drawn the writer to conclude that while the effects of the hydro schemes are reflected to an unknown - probably large - extent in the decreases in recent years of the number of salmon ascending the Pitlochry and Clunie fish passes,

there is no evidence to suggest that these decreases are permanent in view of the efforts now being taken by the Board to improve fish stocks and fishings. These, together with the recommendations suggested by the writer, particularly with regard to flows in the Errochty-Garry, may yet prove successful in making good, at least in part, any losses incurred. It ought to be appreciated, however, that the drift netting for salmon in 1961/62 could have an adverse effect on salmon stocks by the mid-sixties, which would be reflected in counts made at the fish passes.

Finally, the Board have proved themselves to be no overriding despite authority but a body competent in the exercise of a policy designed towards the well-being and protection of the fish and fisheries now so largely under their control as a consequence of the needs of their schemes. By their initiative and endeavour, the Board have set an example which other interested bodies and individuals would do well to follow.

FIG. 49A NUMBER OF MIGRATORY FISH ASCENDING THE PITLOCHRY FISH PASS, 1951-61

Year	Number of Grilse[a]	Salmon	Total
1951	-	-	5630
1952	-	-	5790
1953	-	-	5368
1954	-	-	5357
1955	-	-	4182
1956	452	3103	3555
1957	298	4041	4339
1958	256	3257	3513
1959	105	2969	3074
1960	192	3738	3930
1961	81	3660	3741

FIG. 49B NUMBER OF MIGRATORY FISH ASCENDING THE CLUNIE FISH PASS, 1953-61

Clunie Fish Pass

Year	Number of Salmon and Grilse
1953	268
1954	424
1955	142
1956	118
1957	95
1958	77
1959	124
1960	117
1961	122

[a] For convenience, the following glossary of terms is repeated.

Parr - one year old fish.
Smolt - two-three year old fish. Young fish are known as smolts as they make their way downstream to the sea.
Grilse - one year sea fed fish (age three years).
Salmon - fish four years old or more are known as salmon. These are fish which have spent two or more years feeding in the sea.
Kelts - Immediately salmon have spawned they are referred to as kelts.

FIG. 50 TUMMEL BASIN - RIVER FLOWS

River	Site	Long term average flow before construction of Scheme (million gallons a day)	Average flow after construction of Scheme (million gallons a day)	Average flow after construction of Schem expressed as a %age o former flow
Garry	Above confluence with Tummel	380	248	65.3
Tummel	Above confluence with Garry	600	54	9.0
Tummel	Below Pitlochry Dam	1100	1200[a]	109.0[a]

[a] The increase over the pre-hydro figure is accounted for by the diversion of water from the Spey Basin.

FIG. 51. RIVER TUMMEL (UNNAMED BEAT) - SALMON RETURNS (RODS)

Year	Catch	Year	Catch
1939	162	1950	102
1940	72	1951	77
1941	86	1952	54
1942	109	1953	60
1943	152	1954	62
1944	204	1955	37
1945	33[a]	1956	22
1946	38[a]	1957	36
1947	39[a]	1958	25
1948	73	1959	11
1949	41	1960	18

[a]Low catches blamed on the presence of troops in district.

The above figures were given confidentially, thus the name of the river beat has been withheld. The Clunie Dam was completed in 1950.

FIG. 52. RIVER TUMMEL (LOCAL ANGLING CLUB) - TROUT RETURNS (RODS)

Year	Catch	Year	Catch
1944	63	1953	41
1945	138	1954	55
1946	37	1955	42
1947	115	1956	20
1948	42	1957	20
1949	77	1958	No returns
1950	130	1959	No returns
1951	38	1960	12
1952	27		

In the absence of any knowledge as to the number of rods fishing per annum in Figs. 51 and 52, any comparisons made between yearly catches must be treated with a certain degree of reservation.

FIG. 53A TUMMEL BASIN - NUMBER OF MIGRATORY FISH (KELTS) DESCENDING THE PITLOCHRY FISH PASS, 1951-58.

Year	Kelts
1951	332
1952	579
1953	1130
1954	460
1955	471
1956	642
1957	766
1958	873

FIG. 53B. TUMMEL BASIN - NUMBER OF MIGRATORY FISH (KELTS) DESCENDING THE CLUNIE FISH PASS, 1953-57.

Year	Kelts
1953	-
1954	139
1955	142
1956	52
1957	72

The ratio of descending kelts to ascending fish at Pitlochry is 15% (no record is kept of those passing over the dam). At Clunie the ratio is 39%. These are averages for the years shown. The tables ought to be compared with those in Figs. 49A and 49B.

FIG. 54 TUMMEL BASIN - MONTHLY DISTRIBUTION OF KELTS AT THE PITLOCHRY FISH PASS

	Distribution of Kelts											
Season	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Year
1954-55	28	98	15	4	9	34	129	41	29	21	29	23	460
1956-57		211		19		12	231	77	35		57		642
1957-58		468		23		68	86	47	24		50		766
1958-59		329		27		101	231	107	32		46		873
Four Year Average		284		24		54	169	68	30		57		685

FIG. 55. RIVER TAY - ROD RETURNS, SALMON AND SEA TROUT

Year	Number of Fish	Total Weight, lbs.	Average Weight, lbs.
1952	3546	43,125	12.16
1953	3297	30,333	9.2
1954	4352	46,978	10.8
1955	3175	38,490	12.1
1956	3767	41,932	11.1
1957	4409	44,997	10.2
1958	4913	47,383	9.6

PHOTOGRAPHS

114. The Garry heck at Struan. The heck was built to prevent migratory fish ascending The Garry.

115. The Garry-Errochty confluence. See text as to river flows.

116. The virtually dry course of the River Garry above the heck at Struan. A slight flow is maintained by drainage from hill burns and natural seepage.

117. River Gauge on the Errochty at Trinafour Power Station. This gauge is one of many erected and maintained by the Board to ascertain river flows.

118. Pitlochry Dam spilling after heavy rain. Spates are by no means limited to the winter season. The photograph was taken on 9th August, 1961.

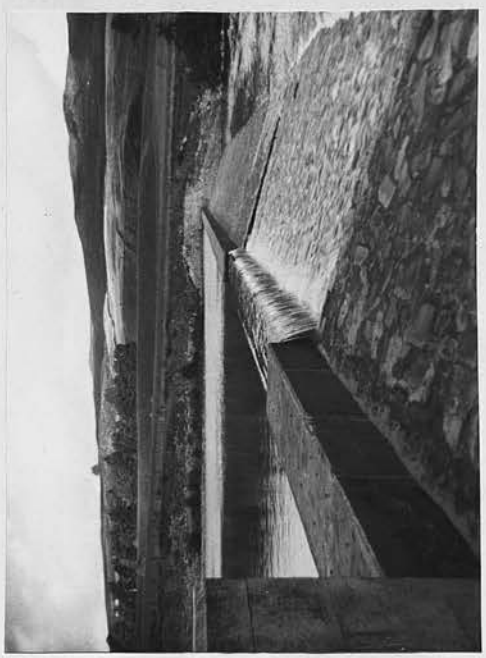
119-120. Gaur Fish Pass. The pass incorporates 70 pools in a head of 92 ft.

121. Dunalastair Fish Pass. This pass constructed by the Grampian Company has 18 pools.

122. The Fresh Water Fisheries Laboratory at Faskally.

123. Fish Pass at Falls of Tummel. The pass was constructed by local interests in 1910 to enable fish to circumvent the falls.

124. Gaur Dam - entrance to Fish Pass. Note the screening of the turbine in-:take.



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CHAPTER 10

FORESTRY

A DESCRIPTION OF BOTH STATE AND PRIVATE FORESTRY

"Sure, by Tummel and Loch Rannoch and Lochaber I will go", run the words of the immortal song, but a change is slowly creeping over the "Road to the Isles". The bleak hillsides of Strathtummel and Rannoch are in the process of being clothed once more by trees. New forests, both state and private, are everywhere pushing back the grouse, the deer and the sheep. The whole region is in process of transforma-:tion.

State Forestry

The Commission have four forests in the Tummel Basin. These are Allean, Fas-:kally, Glen Errochty and Rannoch, and all form part of the Commission's East Con-:servancy District with headquarters at Aberdeen.

State forestry in the Tummel Basin commenced about the end of the second World War. The acquisition of land for planting has been mainly in the Rannoch-Tummel glen, consequently, over half the glen is now Commission property. Land belonging to the Commission now extends, with short breaks, from Faskally House near Pitlochry to Rannoch Moor. Glen Errochty Forest extends northwards from near Tummel Bridge to the glen of the same name. There is also a small detached portion of this forest at Dalnacardoch in Glen Garry.

State Forestry-Acquisitions and Dates — Area of Acquisition

Forest	Date of Acquisition	Estate	Acres
Allean	1944	Allean	2958
	1955	Strathtummel	1042
	1956	Foss and Kynachan	6827
Allean	1944-1956		10827
Faskally	1954	Faskally (No. 1)	-
	1956	Faskally (No. 2)	-
Faskally	1954-1956		1043
Glen Errochty	1950	Auchleeks	2325
	1951	Dalnacardoch	114
	1959-1960	Dalno (Nos. 1 and 2)	2688
Glen Errochty	1950-1960		5127

Forest	Date of Acquisition	Estate	Acres
Rannoch	1947	Dall (No. 1)	3179
	1948	Craiganour	605
	1956	Rannoch Lodge	675
	1957	Camusericht	190
	1957	Black Corries	746
	1958	Barracks	14165
	1958	Dall (No. 2)	26110
Rannoch	1947-1958		45670
Tummel Basin	1944-1960		62667

In the spring of 1961 the Commission acquired the estate of Lassintullich (Rannoch Forest) which extends to approximately 1000 acres. This estate overlooks Dunalastair Reservoir.

Fig. 56 shows land use within each forest as at 30th September 1960, while Fig. 57 gives an indication of the tremendous expansion of state forestry in the area during the post-war period. In some instances, acreages of land were only roughly known at time of acquisition and this, together with the fact that the Commission may have since sold some of the land originally acquired, may account for the dis-:crepancies in acreages which seemingly recur in Fig. 57.

These state forests lie within that district of Scotland where, as Robert Smith wrote in 1900, "we have the meeting of two great regions of vegetation - the temperate and the sub-alpine".[167] For example, Allean Forest contains in the lower gorge of the Tummel below the Clunie Dam a considerable strip of temperate, semi-natural, mixed-oak woodland, while Rannoch, on the other hand, incorporates the 700 acres of the famous Black Wood, to-day a mere remnant of a much greater natural stand of sub-alpine pine forest.

As the climate slowly improved following the retreat of the Pleistocene glaciers, the Rannoch-Tummel glen was colonised by a succession of plant communities leading to the establishment of pine forest during the Boreal period, followed by a spread of mixed-oak woodland in Atlantic times. As each new association advanced up the valley, the older ones retreated to the less favourable sites provided by altitude and exposure. The ancient pine roots which appear like ghosts among the peat hags of Rannoch Moor and elsewhere,[20] possibly date back to the Sub-Boreal period, that is, 4-5000 years ago. It may be that a later slight shift to greater climatic

extremes, enabled the pine forest to recolonise much of the Slios Garbh of Rannoch in historic times, only to suffer eventual decimation at the hand of man. Fate alone has been responsible for preserving the Black Wood down to the present time.

In the main, Smith's definition of the vegetation zones of Northern Perthshire is true for most of the Tummel Basin. The zones are:-

(a) A temperate zone of mixed-oak wood extending to 1000 ft.

(b) A sub-alpine zone of mixed Scots Pine-birch forest and heather-grass moorland from about 1000-2000 ft.

(c) An alpine zone of short heather, blaeberry, alpine meadow, mosses and lichens from 2000-4000 ft.

It should be noted that the mixed oak-birch association mentioned in (a) is now relatively absent from the basin except in the lower reaches of the glens of the Tummel and Garry. On the other hand, the sub-alpine zone of heather-grass moorland is the most extensive association occurring to-day. A study of the limits ascribed to it by Smith would suggest that it owes its extent largely to the presence of the Grampian Lower Surface as defined by Fleet.[a] The existence of pine roots in peat up to 2000 ft. would suggest that the moorland has slowly extended at the expense of the former pine forest complex. Similarly, the moorland has encroached at lower levels on the former mixed oak-birch association, although again, there is evidence that at the present time, the open moorland, at least at lower levels, is steadily being encroached by the rapid expansion of birch and bracken. Although 18th Century records show most of the older birch forest to have been on the tuarach,[b] the fact that to-day much of the deisearach[b] is similarly under a birch-bracken complex, may be due to the same factors, already referred to in the study made of Glen Affric,[c] namely, man's devastation in the past two centuries of much of the remaining original forest leading to a natural recolonisation by birch and the rapid spread of bracken which in turn is directly related to the retreat of agriculture in association with depopulation.[165, 166, 167] This has been most marked in the past 80 years or so.

Thus historic times have witnessed a general retreat of the forest cover

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[a] Page 43

[b] For a definition of these terms, see page 47

[c] Page 196

throughout the basin, partially offset by plantings mainly of exotic conifers over the past two centuries by individual estates, in particular, the Atholl Estates, and and by the establishment of state forests in recent years. While the reasons for the disappearance of the forest cover may in part be due to climatic change, man, it would seem, must bear the main responsibility. The demand for home grown timber and the extension of sheep grazings and deer forest proved disastrous for the contin-:uance of the natural forest cover.[180]

Smith held the opinion that it was quite probable that most land below the 2000 ft. contour, could, after careful study of the conditions, be made to bear coniferous trees furnishing a good timber return. One may recall that 2000 ft. was taken by him as the limit of the sub-alpine zone and marks the present tree-line of birch woodland. However, we learned this was also the upper limit of the heather-grass moorland, a zone which study and observation shows to have been in the past as now, particularly where drainage is good, the main grazing area for deer, hill sheep and the former pursuit of summering hill cattle at the shieling. Any afores-:tation of this area would be from the agriculturalists point of view, to say the least, undesirable, and would raise the problem of reconciling grazing interests with those of forestry. We may note, however, that in Allean, planting has already taken place over a considerable acreage in this zone and over the watershed to the north of Loch Tummel. The effects on agriculture will be discussed later.

At present, the "economic tree line" only reaches into the lower parts of this region to about 1200 ft. It may be somewhat higher than this in the east and lower in the west, where exposure to wind is the main limiting factor. However, since the Commission has only recently acquired the bulk of its land in the basin, it follows that there still remains a considerable reserve of land still to be planted within the total plantable acreage. In 1960, nearly 63% of the land scheduled for forestry had still to be planted. In consequence, the Commission is at present primarily concerned with planting land at lower elevations. But as the years pass, the Commission may be forced to consider raising the present altitudinal limit of plant-:ing to include perhaps the greater part of Smith's sub-alpine zone, so fulfilling

his forecast that successful forestry could be carried on at this elevation.

However, with due regard for Smith's optimism for successful forestry at this altitude, it may be pointed out that in fulfilling same, the Commission are likely to be faced with even greater problems than the reconciliation of forestry and hill sheep.[125, 126] To-day the drainage of much of the sub-alpine zone is poor. This is largely attributable to the lack of good drainage channels particularly in the west, due to the presence of numerous lateral morainic ridges tending to drain back into the hill and leading to the formation of peaty hollows. This, together with man's misuse, including the selective grazing of his domestic animals, in particular hill sheep, has allowed large areas to degenerate into peat hags and mosses afford-:ing only the poorest of pasture. Any reafforestation of this area would necessi-:tate considerable expenditure on the provision of adequate drainage channels and their continued maintenance, while exposure to wind may pose problems through adding to the difficulty and expense of re-establishing the forest cover. The use of Lodge Pole pine as a cover crop would seem a necessary requisite in the establishment of new plantations.

The greater part of the Commission's planting programme is being carried through according to normal forest policy except in areas of exceptional amenity value, such as the Black Wood, and in certain areas of the lower Tummel Valley, between the Queen's View and Loch Faskally. To successfully afforest the variety of topography to be contended with, requires the mixed planting of species to suit the ever chang-:ing ground conditions. It also requires the extension and improvement of the natural drainage, the fencing of large areas, the destruction of vermin including deer within the areas to be planted and the construction of a network of forest roads to provide access to the different parts throughout the life of the forest.

The earliest acquisitions in Allean and Rannoch forests, namely, Allean and Dall No. 1, were fortunate in having a fair network of internal tracks and roads which, with relatively little adaptation, were suited to Commission requirements. The former had a fair pattern of drove roads and rights-of-way while the latter con-:tained a fine network of estate roads built by the Wentworth family towards the end of the 19th Century. On the latter, the roads roughly followed the line of

the old canals,[a] and apart from their use for facilitating afforestation schemes, they also provided access to the hill for shooting.

Rannoch Forest

No description of forestry in the basin would be complete without some reference to the famous Black Wood on the southern shore of Loch Rannoch. This surviving remnant of the "Gret Wode of Caledon" has had a long and eventful history, having been on more than one occasion reprieved from neglect and/or complete felling. One of the earliest of these was in 1749, when it was taken over by the Commissioners of the Forfeited Estates after the failure of the Jacobite Rising in 1745-46. By reducing cutting, by encouraging regeneration and by enclosing parts of it in 1763 and again in 1780 as a protection against grazing animals, the Commissioners greatly improved the condition of the Wood. In 1784, the Wood reverted to the Robertson Estates and during the Napoleonic Wars and in the years immediately follow-:ing, it suffered heavy exploitation when many trees were felled and dispatched by the method described on an earlier page.[a] The Wentworth family bought the Wood in 1857. Some planting was carried out in subsequent years but another period of heavy felling took place during the construction of the West Highland Railway in the late 19th Century across Rannoch Moor, this time for conversion into sleepers. In 1918, the Wood was scheduled for felling but was reprieved by the ending of the war. However, some 8000 trees were felled during the Second World War by a corps of Canadian forest workers, most of the felling taking place in the eastern half of the Wood which incidentally, also experienced much of the brunt of the earlier fellings. These "devastated" areas have since been colonised by birch scrub.[127] The finest part of the Black Wood remaining to-day lies between the Dall Burn and the Allt Camghouran.

Many of the fine Old Caledonian pines are upwards of 200 years old.[128], [129],[130] As in Glen Affric, they vary considerably in shape and quality. Some are tall and straight with no branches for the first 30-40 ft, while other have short boles characterised by heavy branching. Not only does the Wood have a scenic attraction

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[a] Page 101

of its own with its own distinctive plant and animal life but an hour spent within its shadowy confines, fills the traveller with a sense of the past, a step back into history. The Black Wood is a living link between the Scotland of to-day and the Scotland of pre-history.

The Commission's first acquisition in Rannoch was in 1947 when the eastern part of the Black Wood[a] was acquired and latterly fenced to exclude deer and other grazing animals. Later acquisitions followed until in 1958, the outlying portions of the Barracks and Dall estates were added. Consequently, Rannoch is now the largest single forest in the East Conservancy. Of the present[b] land area of 45,666 acres - nearly 71½ sq. miles - 742 acres are classed as acquired plantations, 3000 acres have been planted and another 7251 acres - nearly double the present acreage of plantations - remain to be planted. About one quarter of the total land area is shceduled for forestry, the balance being in agricultural use or under deer forest.

The Commission have decided to retain the character of the forest and to per-:petuate the native Scots Pine by planting only Scots Pine of Rannoch origin. Seeds are collected in the Black Wood[134] and sown in the Ledmore nursery near Bankfoot, north of Perth. When the seedlings are about 3 years old, they are brought back to be planted on their native heath. Forest policy is very similar in some ways to that adopted and already described for Glen Affric Forest, for in addition to using seedlings of native stock, the forest has been divided into three zones, each with its own distinctive planting programme. In the Black Wood itself, the only species planted are Scots Pine of Rannoch origin. Beyond, around the Black Wood, the ground is being planted with Scots Pine but a limited use is also being made of larches and spruces. Over the remainder of the forest normal forest policy is followed, the ground determining the species used. Not all the birch scrub is being cut down, instead conifers are being planted in groups through it.

A section of the Black Wood - a long vertical strip of 200 acres, is being left to natural regeneration and the pines are being allowed to grow unattended. So

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a Dall No. 1

b Refers to 1960

far this experiment has proved fairly successful, this part of the wood having for long been fairly free from deer whose searching muzzles had played havoc with other parts of the forest.[135,136]

By way of interest, naturally regenerated trees appear to be safer from attack from forest "pests" such as blackcock, which nip the centre shoots of trees and so distorts growth. It is suggested that young trees reared in a nursery are sweeter to the taste than their naturally regenerated brothers. This is surely a good reason for extending the practice of natural regeneration in Scottish forests.

At present, the rate of planting in Rannoch is about 400 acres per year which the Commission hope soon to raise to 700. Scots Pine has been found to do exceed-:ingly well locally[a] and will grow on a variety of site types but nevertheless, the peaty soil of much of the forest area and the relatively short growing season - north facing slope - mean that it will be many years yet before there is any large scale production from Rannoch. It is estimated that by 1980 the forest may be producing 1600 tons of timber per annum.

On Rannoch Moor, the Commission have an experimental plot of 106 acres, about half of which is at present planted. Here tree growth under difficult ground and climatic - primarily wind exposure - conditions is being studied.

Allean, Glen Errochty and Faskally Forests

These forests are being planned according to normal forest policy except for a limited amount of amenity planting by the roadside between lochs Tummel and Fas-:kally. Scots Pine is relatively less important but still holds first place with regard to acreage planted, closely followed by the larches - European and Japanese, the spruces - Norway and Sitka and Douglas Fir, in that order. Other species are

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[a] Smith passed the following remarks with regard to the relative merits of Scots Pine and European Larch, the two traditionally planted species of Northern Perth-:shire:-

"During the past century (19th Century) more larch has been grown than Scots Pine, but the prevalence of larch canker on the trees of the newer plantations, has checked its introduction and at present the nativepine is tending to replace it .... Both species grow better at somewhat lower elevations, and seem very similar with regard to their altitudional requirements, the pine perhaps resisting somewhat better the extreme conditions at higher altitudes". Our native pine, therefore, is well suited to the conditions encountered locally within the environ-:mental limit for tree growth. This having been realised by the Commission, the Scots Pine would seem destined to become the dominant species in the forests of the Tummel Basin, despite strong competition from exotic conifers.

relatively unimportant. Broadly the drier sub-continental conditions experienced in this eastern half of the basin, may account for the relative importance of the larches in comparison with the spruces, and contrasts with the wetter west where, in the Craiganour Section of Rannoch Forest, the position is reversed.

Thus a definite pattern of state afforestation is being pursued in the region with due regard to both the wide range of sites consequent on land form and soil type and to the preservation of amenity, in particular, the fine native stock of Old Caledonian Scots Pine in Rannoch. With the exception of the earlier plantings in parts of Allean which are nearing the thinning stage, a large part of the Commission's work in the Basin is as yet in the nature of capital development. Great schemes of drainage and fencing are needed and are currently being undertaken especially in Rannoch. In Rannoch, the Commission aim to fence the entire plant-:able area against deer. Part of the fence has already been constructed. When completed it will traverse many miles of hill and will greatly contribute to capital costs in Rannoch. Such costs are only part of the initial outlay in forestry, for both fences and ditches require maintenance during the life of the forest. The Commission must evidently believe that despite such handicaps, forestry can be made a paying proposition.

Another aspect of capital development concerns the provision of access roads within the forest area to facilitate both planting and maintenance and for the ex-:traction of thinnings and mature timber. Because of its size, Rannoch will en-:tail the largest share of this work. Further, the extension of forestry on to Rannoch Moor at Loch Laidon will necessitate the building of roads across much difficult and boggy terrain. Here, there is a link between the works of the Commission and the North of Scotland Hydro-Electric Board, for if the latter's Laidon Scheme is proceeded with, part of the land earmarked for afforestation to-:gether with certain sections of the existing path across the Moor will be inundated. Consequently, a new access road by the west shore of Loch Laidon may be constructed. If so, then the need for and the construction of such a road lends weight to the argument in favour of a road link between Rannoch and Glencoe, as earlier suggested.

Might not this road serve as a basis for the suggestions made on an earlier page?[a]

As elsewhere, capital development also includes the planning and establishment of forest rides and fire breaks. With regard to rides, recently (1958) a new technique for running high voltage power cables through areas of great scenic beauty such as National Parks without spoiling the surroundings, has been developed by engineers of the South-Western (English) Electricity Board. This involves the running of completely insulated aerial cables through the trees and was first successfully tried out near Hunters Inn in the Exmoor National Park. Previously, timber would have had to be felled to cut a 50 ft. ride through the woods for the cost of underground cables would have been prohibitive due to the rocky sub-soil and distance involved. This technique could be widely applied in the Highlands and so do away with the wasteful necessity of felling existing woodlands and/or sterilising valuable plantable land for the erection of electricity pylons.137

Sufficient has been written to show that the general conditions required for economic forestry, despite certain limitations raised by local landforms, drainage, soils and climate, are to be found in the Tummel Basin and that they are expressed to their best advantage within the habitat of what is at present considered to be the economic tree-line. Nevertheless, it has been suggested that much of the Grampian Lower Surface might be acquired for afforestation. The difficulties pre-:sented, particularly by exposure, are great but not insurmountable. Any great expansion of forestry in to this zone is at present unlikely because of the reserve of plantable land remaining at lower altitudes, but if forestry is to become a basic land use in this part of Perthshire then its success will depend upon how well it can overcome these adverse factors of the environment.

Faskally House

The Forester Training School at Faskally House 80,138 is one of four such schools in Great Britain. Scotland has two schools, the other being at Benmore, Argyll.

Faskally House was bought by the Commission from the North of Scotland Hydro-Electric Board and became established as a forestry training school in 1953, when the former school at Glentress, Peeblesshire, was moved there. Young men aged

[a] Page 284.

17-23 may offer themselves for training but they must first undergo a two year period of practical training in forestry work to show if they have the aptitudes required of a forester. During this period they receive forest workers' rates of pay.[a]

The school course which occupies about two years is both theoretical and prac-:tical. Theoretical instruction covers subjects such as forest botany, silvicul-:ture, protection of the forest against fire, animal, insect and fungi studies, mensuration, surveying, geology and soils. Practical training is undertaken to make the student proficient in the use and maintenance of a wide range of forest tools, teach him how to train forest workers and show him how to organise various forest operations.

Training is free and during this period the student is entitled to free board and lodgings, a travel allowance, an allowance of £2:16/- per week and three weeks' holiday which normally is given between the first and second years of the course. He also spends 12 weeks during the second year of study at one of the other forest-:er training schools to equip him with forest knowledge in a different environment.

On the successful completion of the course, the student is awarded his Foresters' Certificate. This enables him to gain employment with the Commission as an Assistant Forester commencing at a salary of £473 per annum and rising to £619, including a free house and a free pension. Beyond this he may be promoted to forester grade with a maximum of £900 or to head forester rising to £1060, with complete charge of perhaps 3000 acres of forest and 40-50 workers under him.

The Commission is making a determined effort to train the necessary man-power to meet the future needs of forestry - an industry which promises to eventually become one of the major industries in this country. Thereby it is indirectly contributing to the pool of skilled labour in our upland areas, thus reversing the trend of recent decades. Unfortunately, the response from Scottish youth to follow forestry as a career has been falling off in recent years, a trend viewed by the Commission with concern. The reasons seem inexplainable yet in 1961,

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[a]Pages 226 and 227

only 7 of the 23 students at Faskally were Scots. Will this have any direct consequences on the future of forestry in Scotland? In an effort to try and reverse this trend, the Commission recently embarked on a recruiting campaign. The particular aim is to attract young men equipped with passes in the S.L.C. or new S.C.E. to take up forestry as a career.

The number of students, instructional staff and domestic staff resident and in office at Faskally House since the training school was opened. are as follows.

Faskally House Forester Training School - Numbers of Students and Staff (1953-1961)

Year	Students	Instructional Staff[a]	Domestic Staff
1953	14	4	Average 5
1954	32	4	" 5
1955	33	4	" 5
1956	38	4	" 5
1957	31	4	" 5
1958	21	4	" 5
1959	24	4	" 5
1960	26	4	" 5
1961	26	4	" 5

Directorate Workshop

Until recently, the main directorate workshop of the Forestry Commission in Scotland was sited at Blair Atholl. This workshop purchased machine spares for the whole country and was competent to supply any of the smaller conservancy work-:shops with spares, either directly from the depot or through direct contact with the manufacturers. The major repair work carried out was the overhauling and repair of heavy tracked vehicles, each machine being overhauled once every three years.

The workshop was originally the headquarters of a Canadian Forestry Corps during the war. It then came into the hands of the Board of Trade for the dis-:posal of army vehicles and other equipment. The Forestry Commission acquired it in 1946. In August, 1960, the staff numbered 21, of whom 18 were local.

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[a] Mr Norman Tulloch - education officer in charge of the school; Mr Alexander Cranson - assistant education officer; and Messrs. Ian Garrioch and Darcy Black - Forester instructors.

Workshop Staff

Fitters	10
Welders	1
Drivers	2
Stores	4
Office	2
Cook	1
Administration	1
Total	21

Recently (early 1962), the Commission moved the depot to Chapelhall in Lanarkshire, the reasons stated being (a) the Blair Atholl site was never looked upon as more than a temporary expedient, (b) the big machines had to be moved where servicing could be done more speedily, (c) this was in accordance with their centralisation policy.

While unable to speak with authority on (a) or (b), the writer cannot fathom the reasoning behind (c). Geographically, Blair Atholl is centrally placed and of easy access from all four conservancies. After all, three-quarters of Scotland's forests are north of the Forth-Clyde. Further, the village lies astride the A.9. Whatever the merits of the move from the Commission's viewpoint, it is a sad blow to a village whose total population is only about 450, particular-:ly when it coincides with contraction in the labour force in other local indus-:tries. The change over from steam to diesel propulsion on the railways and the closing of local engine sheds has led to a reduction in railway workers and staff, while the nearby Shierglas Limestone Quarry has for economic reasons been forced to dispense with a number of employees.

Forest Workers' Holdings

The Commission have at present 7 forest workers' holdings in the Tummel basin. They are divided among the various forests as follows:-

Forest	Holdings
Allean	1 at Drumnagowan, Glen Fincastle
	1 opposite Strathtummel Youth Hostel
Glen Errochty	1 at Bochonie
Rannoch	2 at Carie
	2 at Dall

Many people expressed doubt as to whether or not such holdings would be a success for it was argued that their establishment was against the general trend

in the district towards larger economic units. A holder receives the basic wage of a forest worker and for his "tied" cottage he pays a rent according to the size of the holding. No evidence was found that the holders in the district were dissatisfied with their lot. The holdings at Dall and Carie are approximately 20 acres each in size together with an outrun on the hill for grazing. To work such a holding in addition to forest work means a long day and consequently, the holders must at times wish they could give their full-time to the working of the holding. But there is nothing unsettling in this outlook. As small holders they have a measure of independence which the ordinary forest workers lacks. The Commission have suggested they may add to the number of existing holdings. New holdings may be established in the Foss acquisition of Allean, in Rannoch near Bridge of Gaur and in Glen Errochty north of Tummel Bridge.

Private Forestry

Hunter [83] aptly described the suitability of his native Perthshire for the growth of good timber in writing:-

"We may say of the forest trees of Perthshire generally that whether owing to the configuration of the county, and its inland position lending a more con-:tinental and less insular quality and value to its climate, there can be no doubt that they exhibit greater vitality and more rapid and better progress within a given period than the trees of any county in Scotland as a whole."

Perhaps because of a similarly held belief and with a view to cashing in on the apparent suitability of Perthshire's climate for the growing of trees, the first plantings on a fair scale in the county were tried out in the first half of the 18th Century on the Atholl Estates by the Second Duke, and on the Chesthill and Meggernie estates in Glen Lyon by James Menzies of Culdares.

The plantings in Atholl were continued by the Third and Fourth Dukes. In-:deed, the Fourth Duke, John, because of his zeal for planting, was referred to as the "Planting Duke". Under his guidance the acreage of woodland on the Atholl Estates increased to 15,500 acres[a] between 1774 and 1830.

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a The acreage in 1738 is reputed to have been 1000 acres

It is interesting to record that almost all this vast planting programme was undertaken with European Larch - first popularised by the Second Duke. This has since all been felled, although 9 of the original 11 larches planted in the vicinity of Blair Castle still survive.

Hunter suggests that Duke John's enthusiasm for planting was awakened by Burns' "Humble Petition of Bruar Water"

"Would then my noble master please,
To grant my highest wishes,
He'll shade my banks wi' towring trees,
And bonnie spreading bushes.

Delightful doubly then my Lord,
You'll wander on my banks,
And listen many a grateful bird,
Return you tuneful thanks."

Whether or not this may be so, the succeeding decades witnessed considerable plantings of larch, spruce and Scots Pine along the banks of the Bruar. Unfortun-:ately, most of these trees were blown down by the great gales of 1879 (Tay Bridge disaster) and 1883.

Planting was continued on a lesser scale by the Dukes who succeeded John, much of it being done with European Larch. This century, particularly in the earlier decades, most planting has been with Hybrid Larch, the parent of this hy-:brid being Japanese Larch fertilised by European Larch. More recently, spruces have become popular due to changes in market demand. The policy at present is to plant spruces wherever suitable with Hybrid and European larches on most of the remaining sites, the former being used on the more elevated sites. This trans-:formation is being brought about by introducing suitable mixtures of species in small and medium sized groups.

At present there are 8000 acres of dedicated woodland on the Estates. Of these, 300 acres are hardwoods, 5,800 acres mixed conifers - mainly larches and spruces-and 1,900 acres of felled and other woodland. A further 250 acres, includ-:ing policy woods, remain undedicated. The total acreage of the Atholl Estates is approximately 140,000.

Planting is in the region of 200 acres per annum which it is hoped to increase

eventually to 650. Thinning is undertaken on a three year cycle for fast growing conifers, for example, spruce, and a five year cycle for those of moderate growth, for example, Scots Pine. The Estates have their own sawmill and preservation plant which turns out fencing material for sale in addition to meeting home re-:quirements.

The number employed in forestry is 58 (1961). These may be classified as follows.

Forest Staff (Atholl Estates)

Woods Manager	1
District Foresters	4
Forest Workmen[a]	50
Office Assistants	2
Carpenter	1
	58

The Atholl Estates have one of the largest private woodland schemes in opera-:tion in Scotland and form an important part of the forestry programme in Northern Perthshire.

There are no estates growing timber under the Approved Woodlands' Scheme but Fig. 58 shows those with dedicated woodlands. The total area under dedica-:tion is 7411 acres but no record was readily procurable as to the actual acreage under plantations at present. This varies considerably from one estate to another but it is estimated that over 6000 acres are already planted. The importance of private forestry may be gauged from a comparison of Figs. 56 and 58.

In addition, six other estates have done some planting under the Approved Woodlands' Scheme in recent years. These are Balnakeilly, Crossmount, Lude, Port an Eilean, Strathgarry and Urrard.[b]

Forester Training

Recently, annual courses, each of six weeks' duration, have been organised by the Forestry Commission for forestry workers from private estates. These have been held on the Atholl Estates by courtesy of the owner and proved emminent-:ly successful. On the successful completion of the course, a man may obtain

a This category includes permanent sawmilling staff, horsemen, truck and tractor drivers.

b State forests, private estates with dedicated woodlands, and estates with wood-:lands under the Approved Woodlands' Scheme are shown in Figs. 68A and 68B.

the Junior Forester's Certificate of the Royal Scottish Forestry Service.

FIG. 56 TUMMEL BASIN, STATE FORESTS, LAND USE - 30th SEPTEMBER, 1960

Forest Name	Land Area Acres	Under Plantations[a] Acres	To be Planted Acres	Total area scheduled for Forestry Acres	Agricultural and other Land Use Acres
Allean	9874	2551 (25.9%)	1691 (17.1%)	4242 (43.0%)	5632 (57.0%)
Faskally	1061	348 (32.8%)	588 (55.4%)	936 (88.2%)	125 (11.8%)
Glen Errochty	5167	989 (19.1%)	3285 (63.6%)	4274 (82.7%)	893 (17.3%)
Rannoch	45666	3742 (8.2%)	7251 (15.9%)	10993 (24.1%)	34673 (75.9%)
Total	61768	7630 (12.3%)	12815 (20.7%)	20445 (33.0%)	41323 (67.0%)

[a] Includes acquired woodland

FIG. 57 TUMMEL BASIN - EXPANSION OF STATE FORESTRY SHOWING LAND USE OVER THE PERIOD 1948-60

Forest Name	Land Area (Acres)					Under Plantations[a] (Acres)					To be Planted (Acres)				
	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960
Allean	2939	2939	2939	9889	9874	264	898	1450	2026	2551	685	1179	615	2494	1691
Faskally	-	-	242	1043	1061	-	-	130	248	348	-	-	50	677	588
Glen Errochty	-	2440	2440	2509	5167	-	18	445	707	989	-	1632	1187	994	3285
Rannoch	3179	3786	3786	5122	45666	695	1063	1787	2326	3742	2482	2326	1602	2013	7251
Total	6118	9165	9407	18563	61768	959	1979	3812	5307	7630	3167	5137	3454	6178	12815
East Conservancy District	132600	176342	192993	230510	286005	64278	87655	113077	135107	151233	35480	43961	30282	36519	42107

Forest Name	Total Area Scheduled for Forestry (Acres)					Agricultural and Other Land Use (Acres)				
	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960
Allean	949	2077	2065	4520	4242	1990	863	874	5369	5632
Faskally	-	-	180	925	936	-	-	62	118	125
Glen Errochty	-	1650	1632	1701	4274	-	790	808	808	893
Rannoch	3177	3389	3389	4339	10993	2	397	397	783	34673
Total	4126	7116	7266	11485	20445	1992	2050	2141	7078	41323
East Conservancy District	99758	131616	143359	171626	193340	32842	44726	49634	58884	92665

Figures for the East Conservancy District are shown for reference.

[a]Includes acquired woodland.

FIG. 58 TUMMEL BASIN - PRIVATE WOODLANDS (DEDICATED) 30th SEPTEMBER, 1960

Estate	Owner	Land Area Acres	Dedicated Woodland Acres
Atholl (part of)	Hon. Mrs Campbell Preston and a Trust	130,000 (estimate)	5600 (north of Logierait/Dunkeld and Dowally parish boundary)
Auchleeks[a]	Lieut.-Col. Dundas Robertson	11,000	158
Baledmund	J.L.F. Fergusson, Esq.	3,400	167
Bonskeid	R.S. Barbour, Esq.	3,500	421
Cluniemore	Major D.H. Butter	6,500	391
Dunalastair	Major La Terriere	17,000	506
Linn of Tummel[b]	National Trust for Scotland	Not specified	50
Talladh Bheith	Capt. S.J. Loder (owns only dedicated woodlands)	-	118
		Total	7411

[a] Recently sold (1962)

[b] Originally part of Bonskeid Estate but because of its amenity value acquired by the National Trust for Scotland.

For map showing the location of these estates, see Figs. 68A and 68B.

PHOTOGRAPHS

125. Preparation of land for Planting - Sub-Alpine Zone (1200 ft.).

126. Deep Ploughing - Sub-Alpine Zone (1200 ft.).

127. Recolonisation of Felled Areas by a Birch/Bracken complex, the Black Wood of Rannoch.

128-130. A Fine Specimen - The Black Wood. Phot. 129 shows the heavy branching of such trees, a notable feature of naturally regenerated woodland. Phot. 130 shows the bole of the tree. The biro pen (6 inches long) gives an indication of scale, the bole measuring over 12 ft. in circumference. The largest pine in the Black Wood has a bole 20 ft. in circumference.

131. Natural Regeneration of Pine - The Black Wood. See description of field layer Phot. 21. Note the dominance of heather in open pine woodland as opposed to bracken in felled areas now recolonised by birch (Phot. 127).

132. Natural Regeneration of Birch - The Black Wood.

133. Wintering for Deer - The Black Wood. Many thousands of deer formerly wintered in the Black Wood, but since the erection of fences by the Forestry Commission, they have been largely excluded.

134. Collecting of Pine Seeds - The Black Wood. Seeds collected from the Black Wood are sown in Ledmore nursery, Bankfoot. When three years old, they are replanted on their native heath.

135-136. The Effect of Fencing on the Natural Regeneration of Woodland - The Black Wood. Where fenced (Phot. 136) regeneration - notably pine, birch and rowan (mountain ash) - is prolific.

137. Forest Ride to facilitate the Passage of High Voltage Electricity Trans-:mission Lines - Allean Forest.

138. The Forester Training School, Faskally House.

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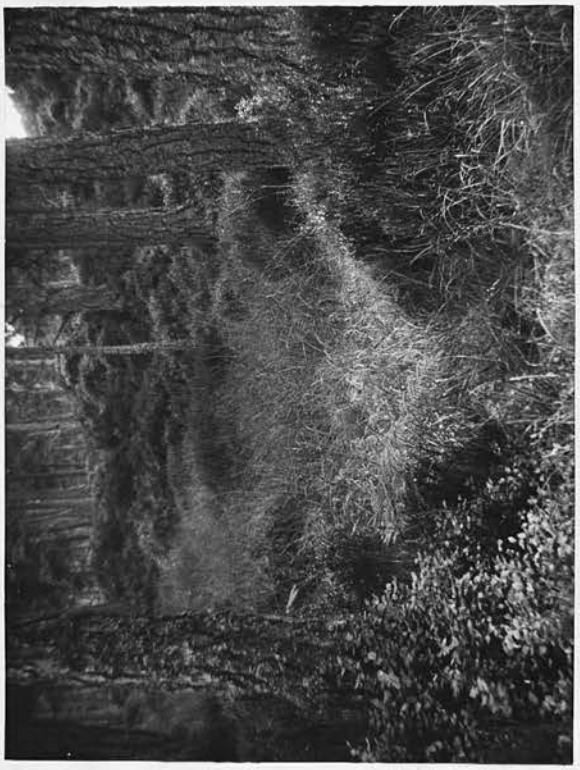

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CHAPTER 11

HYDRO-ELECTRICITY AND FORESTRY - THEIR EFFECT ON LAND USE, IN PARTICULAR, AGRICULTURE

In consequence of the siting of the Board's schemes and the acquisitions made by the Commission, hydro-electric generation and state afforestation are at a premium in the Tummel Valley and thus in this chapter we shall be primarily concerned with events in that area. Later, reference will be made to private forestry in relation to agriculture.

Hill sheep farming was, and still is, the basic land use in the Basin. In terms of land use the agricultural economy is therefore geared to the needs of hill sheep. Every sheep farm in the valley is based upon a small area of enclos-:ed bottom land, usually on a lochside fan or an alluvial haugh, devoted in summer to the growing of fodder crops for winter feed and in winter for grazing; a summer outrun extending to the watershed above 2000 ft., and a winter grazing in the mixed birch scrub woodland which commonly clothes the lower hill grazings. This latter grazing serves in a number of ways. These are:(a) in helping to eke out the fodder crops, particularly in hard winters; (b) in providing shelter not only for hill sheep and cattle in time of storm, but also for red deer which migrate down to the lower ground at the approach of the first winter snows; (c) in promot-:ing an early bite in spring; and (d) as a natural shelter for the lambing of hill sheep.

The economy of many hill sheep farms is a finely balanced one. Its success depends on the continuance of an even balance being maintained between the in-bye and the outrun. Any interference to this balance brought about by outside in-:fluences may have far-reaching and perhaps adverse effects on the whole farming economy. This may be particularly critical when competition for land arises as between agriculture and hydro-electricity and/or forestry.

Briefly one will recall that by the critical need to provide adequate stor-:age for hydro-electric generation, existing lochs may be enlarged or new ones created, with the consequent loss of much bottom land. This may result in not

only the loss of valuable land for the growing of winter keep, but also the wintering capacity of such land. The extension of forestry may lead to a clash of interests with regard to land use on the lower hill slopes. Such areas may provide excellent land for tree planting but they are also vital to the hill farmer because of the shelter provided for wintering and lambing. Again, the inevitable forest fences may deny not only access to these winter grazings but also to the hill above for summering.

In such ways hydro-electric development and the extension of tree planting may concur so as to adversely interrupt the local farming economy. Should any serious interruptions to grazings follow, then the future of individual farm units may be jeopardised.

Hydro-Electricity

In consequence of the Board's Tummel-Garry Scheme, 1661 acres were flooded, of which 931 acres were in the Tummel Valley - almost equally divided between Lochs Tummel and Faskally - and 740 acres in Glen Errochty. In the latter case all of the land submerged was classed as rough hill and deer forest and consequently, its loss has had little or no effect on local agriculture. In the Tummel Valley the classification of land now inundated was as follows.

Classification	Acreage	
Fair Arable	51	Total arable 100
Poor Arable	49	
Swampy and liable to flooding	350	
Rough hill and Scrub	471	
	921	

Unspecified acreages were flooded at Dunalastair by the Grampian Company and later by the Board at Loch Eigheach under the Gaur Scheme.

The properties affected at Lochs Tummel and Faskally, together with a broad classification of the land inundated, are as follows.

Loch Tummel

Property	Loss through inundation
North side (west to east)	
Dalcroy	All of arable
Bohally, Bruckbane	Enclosed land
Chamberbane	Small area of land at lochside
Borenich	Several acres at lochside
Ardgualich	About one half of enclosed land
South side (east to west)	
Netherton (East Duntanlich)	Most of arable land
Mains of Duntanlich and part of Frenich	Most of arable land
Foss Home Farm, Donlellan and part of Frenich	Most of enclosed land north of the road
Mains of Kynachan	Most of arable land
Loch Faskally	
Cluniemore	Arable on both sides of the river north of the Old Clunie Bridge
West Clunie	Several acres of arable

Approximately 92,000 cu.ft. of timber were cut from the bed of the new loch.

It is a common mistake, though widely practised, to evaluate land in accord-:ance with a national scale. Consequently, what may locally be classed as "good" land in the Tummel Valley would have a much lower classification on a national scale because of its relative infertility in comparison with the fine, deep, fertile soils of the Lowlands. But since "good" land is limited in the Tummel Valley any contraction in its acreage may have more serious effects on the local farming economy than the loss of a similar acreage in a Lowland district. This point must be borne in mind in any assessment of the effects of the scheme. Con-:sequently, the writer would venture to submit that the classifications of land shown in the accompanying table have been over-simplified and that where the words "fair" and "poor" are used, it would be more correct to read "good" and "fair" respectively. The phrase "swampy and liable to flooding" is likewise misleading, for it gives no indication of the grazing value of such land.

Similarly, the Acquisition Reports of Rannoch Forest classify land in one place as being "old woodland, sport and ....?" while in the Craiganour Section, we may read of land recorded as being fit for "a few sheep". This evaluation may reflect the sorry condition into which much hill land had fallen but it can

hardly be said to take into account its real value in the hill sheep farming economy.

Loch Tummelside

By the construction of the Clunie Dam, Loch Tummel was raised 17 ft. and its length extended approximately two miles either way. Nearly 500 acres were sub-:merged the greater part at either end. Because of the steep north shore, the acreage inundated was small except in the west near Bohally and Dalcroy but along the gently sloping south shore, much pasture and arable, primarily on alluvial fans built out into the loch by hill burns including the Allt Kynachan, Allt Kinardochy and Frenich Burn, was submerged. Much of the arable was under fodder crops including oats, hay, turnips and rape. Potatoes and barley were also of importance. How have these losses affected agriculture? Here is a selection of short notes on some of the farms affected.

South Shore (east to west)

Fig. 59 shows that because of the configuration of the valley, the Tummel on exit from the original loch flowed close to the north side of the glen. As a result there was about 400 yards of very gently sloping land between the road and the river which provide arable for both cropping and wintering. Most of this land is now submerged. The current distance between the road and the new loch varies from 0-100 yards.[82,83,84]

1. Mains of Duntanlich 63 acres flooded, including 50 arable and 13 rough grazing. Only 6 acres arable remain for oats and hay. Loss of arable has meant farmer cannot keep 20 milk cows he might otherwise have had. Sheep stock not affected as to number but sheep now marketed as store instead of outwintering as formerly. Road much better to-day. Formerly two tracks with grass down middle. New loch reckoned to be scenically a great improvement.

2. Netherton 76 acres flooded, including 50 arable and 26 rough grazing. Only 9 acres arable remain and 1500 acres of hill land. Effect on hill sheep as for farm No. 1 Lambing now done in birch woods on lower hill slopes. For-:merly lambing on lower ground (earlier) now inundated.

3. Foss Home Farm and Frenich[a] Farms worked as one - 2052 acres. 150 acres - arable and good meadow. Former meadow sheltered by ash and beech was an asset for wintering and lambing. 140, 141 Loss expressed in a reduction of 250 ewes in former sheep stock of 600. Cattle reduced from 20 to 15. In consequence of flooding, farm of Drumnakyle purchased in 1950 - carries 700 ewes and has arable. Other small neighbouring farms of Daloist, Kirkton and Tombreck also taken over. These together with Drumnakyle extend to 2453 acres. To make good losses of arable by flooding, 35 acres of former hill on Foss broken in and worked on a 3-4 year rotation. Loss of sheltered meadow referred to above

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[a] See effects of forestry, page 340.

means that wintering now has to be done away from home at Grantown-on-Spey (October - April, 33/- per head). Since purchasing of Drumnakyle, cattle stock now increased to former figure. Foss Home Farm was formerly half a mile from loch but is now only 70 yards away. Inferred that as a consequence of loss of land through flooding, farm staff reduced by one full-time employee and one casual worker.

4. Mains of Kynachan[a] 142 Farm worked by family who also tenant Braes of Foss. 190 acres flooded, including 130 arable and 60 meadow. Much of the latter was boggy but good for early grazing. Farm has 350 acres of hill.

North Shore (west to east)

5. Dalcroy 12 acres arable (only arable) available flooded. Farm left uneconomic and taken over by Dalno.

6. Bohally 143,144,145 Former farm house now shooting lodge. Land now worked from Grenich (950 ft.). Most favourable acreage (not specified) flooded. Land at Grenich too steep and soil too then to be worth improving but some arable for fodder. Bohally Wood excellent for shelter, wintering and lambing. Sheep stock (400) same as pre-war. Reckoned that to be paying proposition, 650 required to-day but no room for expansion.

7. Borenich Some arable (acreage unspecified) lost. This offset by breaking in some former croft land (1000-1200 ft.) which had lain fallow for 70-90 years. Results promising.

8. Ardgualich[a] 6 acres arable (one half of total) flooded.

Loch Faskallyside

Cluniemore and West Clunie 116 acres arable and 53 acres of permanent grass and rough grazings submerged. This more than offset by acquisition of 137 acres arable and 242 acres of woodland and rough grazings from neighbouring Fonab Estate (Forestry Commission). Therefore no material loss from hydro-electric shceme.

The inevitable result of the scheme at Loch Tummelside has been the loss of much bottom land - arable, improved grass and rough - of considerable importance to the agricultural economy. The effects differ somewhat between individual subjects but in almost all cases the initial effect was a reduction in both the numbers of cattle and sheep. Losses have been made good in part by either the amalgamation of former farms into one unit as at Foss or by the breaking in of new land for cropping as again at Foss and Borenich. The loss in wintering is expressed in the increased need to-day to winter away from home. While the adverse effects of the scheme are obvious these have been partially offset by a more intensive use of the land remaining.

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[a] See effects of forestry, page 340

At Bunrannoch, similar losses to those related above were incurred 30 years ago following the impounding of Dunalastair Reservoir. The pattern of enclosures and the former river course are still quite distinguishable from air photographs. In places the seepage of ground water far beyond the shore of the new reservoir makes the cultivation of neighbouring fields exceedingly difficult, 146 an effect also noticeable by Loch Tummel, particularly where the shore-line shelves less steeply.

One will recall that at the Tribunal of Inquiry into the Tummel-Garry Scheme, it was expressed that certain losses would follow to agriculture if the scheme was constructed. While it is probable that wintering for 1500 sheep has been lost, there is no evidence that sheep stocks have declined by that number. As indicated in Fig. 60, the number of sheep to-day (1960) greatly exceeds the number in 1948. The writer was unable to trace whether or not any herd of T.T. cattle had been dis-:placed as a consequence of the scheme, although the number of dairy cattle in the Basin are known to have declined for other reasons expressed elsewhere.[a] An esti-:mated 20-25 people, including dependents, are thought to have been displaced by the scheme and not 50 as forecast. These losses pale into insignificance consider-:ing the employment given both temporarily and permanently as a consequence of the Board's works.

Unlike Strathglass, farming has benefitted much less from flood control exer-:cised by the dams than one may have expected. With the exception of grazings (mainly rough) little agricultural land actually borders the river except downstream from Pitlochry. Here, flooding is less than formerly but a danger apparently still exists to stock from (a) overspill from the dam following heavy rain, and (b) occa-:sional excessive discharge from the dam.[b] Between Struan and Killiecrankie, in consequence of the dewatering of the Upper Garry and tributaries, both the incidence and severity of flooding have been lessened to the ultimate benefit of farming.

The diversion of water from hill burns may have contributed to an improvement in the drainage of adjacent slopes but the effects are so localised in area that no agriculturalist considered them worthy of mention. As in Glen Affric, there is

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[a] Page 358

[b] See also under Fisheries, pages 300, 301, 313 and Phot. 118.

apparently as yet no liaison between the Board and the Commission with regard to the probable effects of tree planting on run-off and river flows. Suggested reasons for this anomaly are (1) the bulk of the precipitation falling over the catchment basin is on land either too high or as yet unaffected by forestry, and (2) the Commission is a relative newcomer into the field in Northern Perthshire.

State Forestry

In 1956, the Commission acquired the land at Foss and Kynachan. Of 6827 acres acquired, 1601 acres were scheduled for forestry. As expected, local farmers viewed these acquisitions with alarm, particularly those who had already suffered contraction through the raising of the level of Loch Tummel. But there is evidence that care has and is being taken to minimise any adverse effects of planting on local agriculture. The writer visited the area in 1959. Then, it was learned, approximately 900 acres on Foss-Frenich-Drumnakyle were scheduled for planting, 500 acres earmarked for Foss alone. It was suggested that in consequence, although wintering would be reduced, the stock carrying capacity of the hill would suffer little diminution. The present stock of hill sheep would probably have to be re-:duced initially, but the farmer considered that a more intensive use of the hill was possible by careful draining and in parts re-seeding, which would help offset any loss of land to forestry. He did not expect the new plantations to be of any great shelter benefit as much of the land scheduled for forestry was land on which shelter was at present fairly good.

At Kynachan all the low ground east of the B846, with the exception of about 25 acres round the farm house and steading, will be lost to forestry. This includ-:es much birchwood and scrub of inestimable value for wintering and lambing. One will recall that Kynachan had already lost the greater part of its bottom land through the raising of the level of Loch Tummel. This, together with the small acreage of hill grazing (350 acres), had resulted in the farm being no longer an economic unit and this seems to have influenced any decisions taken with regard to the direction of land on the farm, for the largest of the Commission's plantations in the area is scheduled to occupy land extending from the banks of the loch at

Kynachan farm along the bottom of Craig Kynachan following the valley of the Allt Kynachan as far as the double circuit line of electric pylons.[a] One could, therefore, conclude that the farm of Mains of Kynachan as an individual unit has been sacrificed in the interests of state forestry and hydro-electricity. Part of the hill at Kynachan will continue to be worked from Braes of Foss but whether the inevitable result will be a serious understocking of the ex-Kynachan hill grazings as a permanent feature of the economic land use in this corner of the Tummel glen, it is as yet too early to ascertain.

Unlike the tuarach, land schedule for forestry or already under plantations on the deisearach in Allean, extends right to the watershed. This has had the effect of almost eliminating the former small sheep farm of Ardgualich (510 acres). One may recall that 6 of the original 12 acres of arable were lost when the level of Loch Tummel was raised. At time of Departmental inspection (Agriculture) in June 1944, the hill, which rises steeply to over 1000 ft., was badly infested with bracken. Only 70 ewes and 2 cows were carried. Consequently, a good deal of summer letting was relied upon to obtain a living. Little future was seen for the subject as an economic agricultural unit and therefore, as the subject was not passed to the Department of Agriculture for management, the whole of the hill was scheduled for forestry and has since been planted. The original tenant is still in residence and although a few sheep are still carried, he seems to rely primarily on the letting of the remaining land - about 12 acres of former arable and rough - for caravanning. His future is at present (1960) most uncertain as it is not considered by the tenant as worthwhile to sink capital into the development of the site in compliance with the new regulations for caravan sites now in force. Further, the farm and steading have no electricity.

Dalno was acquired by the Commission in 1959/60. This included the original sheep farm of Dalno together with land formerly worked from Over Bohespic and Nether Bohespic (both acquired by Dalno at the end of the Second World War) and Dalcroy (acquired by Dalno when Loch Tummel was raised). The total acreage acquired by the

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[a] Fig. 23, reference 769569

Commission is nearly 2700. The Commission had little difficulty in acquiring this land as the tenant, who was also owner, proved a willing seller. Since dis-:posing of the land to the Commission the former tenant has branched out into another business locally,[a] but between 1960 and 1962, he has also been managing the former stock until the land is due to be cleared for planting. During this period the tenant at Drumnakyle has also had use of the land free of rent.

What of the remains of the once extensive townships in the vicinity?[b] Per-:sonally, the writer would be greatly perturbed if no record is made of the ruins, including mapping, before planting commences. None exists so far as is known. Such would provide an interesting and entertaining study for the Geography Depart-:ment of one of our universities and would help shed further light on the social history and land use in Rannoch and Atholl over recent centuries. Since the Commission has given careful consideration to such sites elsewhere, there is hope that at least some of the ruins may be preserved.

The changing agricultural economy of the past century has witnessed the steady consolidation of the smaller and less viable units into larger and more economic ones. The reader may recall mention having been made of these changes in Chapter 2B. It would seem that the works of the North of Scotland Hydro-Electric Board and the Forestry Commission have contributed to a speeding up of this process. Generally, by intensifying competition for land, the less economic units have been weeded out and have ceased to function as individual units. Even without the pressures applied by the Board and Commission, it is doubtful if many of these units could have continued to function profitably for long. Some losses have occurred - it is regretted that much valuable improved land was submerged on Loch Tummelside - but this has also been beneficial in that it has made necessary considerable reorganisa-:tion of farm management and a more intensive use of the land remaining to agricul-:ture. Population drift from the land can only be stopped if agriculture itself is felt to be a viable industry in the minds of those concerned. In Chapter I it was inferred that the real root of the problem stems from the pattern of occupation rather than from the nature of the land itself. If hydro-electricity and forestry

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a Page 360
b Page 51

have helped shake the agricultural industry out of its former complacency and so help the industry to establish itself on a sound economic footing, then the changes have been worthwhile despite any losses or hardships entailed by individuals. It is the writer's belief that we are currently witnessing a much fuller utilisation of the major natural assets of the Tummel Basin, namely, water power, the forest ground and the hill grazing.

In order to find out more about how the latter of these two assets were being developed, the author undertook a broad study of two adjacent sheep farms both tenanted by the same family. The information was given confidentially and hence, for obvious reasons, the farms will be left unnamed. For similar reasons no refer-:ence will be made to the exact acreages or numbers of stock carried. The farms themselves will be referred to as Farm A and Farm B.

On Farm A the Commission acquired and planted a large area of land which had previously carried a stock of Blackface breeding ewes. As a consequence of the loss of this land, the stock of ewes has had to be reduced by 25%. In addition, the sheep had previously had access to an outrun which was also classed as deer forest. Forestry operations made necessary the enclosure of this outrun with a deer fence. The outrun had previously carried, in addition to sheep, a permanent stock of deer, mainly aged animals, which, since enclosure, have been dealt with by the Deer Commission.

The most serious effect to agriculture as a result of the Commission's work has been the enclosure of former wintering ground for deer on this and neighbouring farms. Consequently, literally hundreds of deer have been funnelled on to the sheep farms during the winter months and any improvements to sheep grazings are eaten by deer. It is recognised that to have a reasonable stock of deer on the land is only natural but it is a known fact that deer stocks have been so mismanaged in the district over the past 30 years, that they have increased out of all proportion. The Deer Commission are alive to the deer "menance" and have been most co-operative in that they have recommended with some success to the owners of deer forest in the neighbourhood, that deer stocks should be reduced to manageable proportions.

The Commission have recently shown that they are alive to the deer problem for they have agreed to erect a deer fence to protect sheep farms in the area. While the Commission may rightly be blamed for the damage now being caused to agricultural interests by deer, this agreement is no mean concession on the part of the Commission, considering current costs of erecting an adequate deer fence which in this case will extend for several miles.

Praise was given to both the Department of Agriculture and to the Commission for being co-operative in allowing muirburn and in the carrying out of hill drain-:age schemes so that by improving the remaining pasture, sheep stocks might be maintained. In consequence, there was every hope that sheep stocks on the farm might yet be raised in number to their former level.

Farm B was the subject of a hill farming scheme under the Hill Farming Act, 1946. Several thousand pounds were jointly spent by the Government, landlord and tenant on land and farm building improvement. It is thus surprising that the Forestry Commission were able to take over any of the farm for tree planting. That this should have been possible is a matter which raised considerable comment in the district at time of acquisition and one which has not been entirely resolved.

The Hill Farming Act, 1946, is defined as, "An Act to make provision for pro-:moting the rehabilitation of hill farming land; for the payment of subsidies in respect of hill sheep and hill cattle; for controlling the keeping of rams and ram lambs; for regulating the burning of heather and grass; for amending the law as to the value of sheep stocks in Scotland; and for purposes connected with the matters aforesaid."

In Paragraph 1 we may read:- "Before approving a hill farming improvement scheme the appropriate Minister shall satisfy himself as to the following require-:ments, that is to say, -

(a) that the land for the benefit of which the improvements are proposed ought to be used for hill farming purposes, and comprises an area suitable to be dealt with as a unit for the purpose of rehabilitation thereof for such purposes, and that the improvements proposed are comprehensive enough to provide adequately for the

rehabilitation of the land for such purposes; and

(b) that the cost of the work required for making any of the improvements proposed will not be unreasonably high in relation to the benefit to be derived therefrom; and before varying an approved scheme under any of the provisions of this Act in that behalf he shall satisfy himself that the scheme as varied will be in conform-:ity with those requirements."

It is interesting also to record the Act's definition of certain expressions used under the terms of the Act. These are noted in Paragraph 3 and are:-

"the expression 'hill farming land' means mountain, hill and heath land which is suitable for use for the maintenance of sheep of a hardy kind but not sheep of other kinds or which by improvement could be made so suitable;

the expression 'hill farming purposes' means the maintenance of sheep of a hardy kind and the keeping and management thereof in accordance with the recognised practices of hill sheep farming, and includes other activities carried on in connec-:tion therewith; and

the expression 'improvement' means, subject to the provisions of this section, an operation of any of the kinds specified in the First Schedule[a] to this Act, and any operations incidental to, or necessary or proper in the carrying out of, an operation of any such kind or for securing the full benefit thereof".

From the wording of the Act there can be no doubt about the use to which such land which has experienced improvement under the scheme ought to be put. It might, however, from Paragraph 3 be assumed, that "the other activities carried on there-:with" might include afforestation, perhaps from the point of view of the shelter afforded to stock or the long term improvement which trees have on the fertility of the soil. But the meaning of this latter phrase is made quite clear in the explan-:atory memorandum issued to all applicants under the scheme which, with regard to the use of the land states, "..... no other purpose, for instance, afforestation."

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[a] First Schedule - Improvements which may be included in schemes for the rehabili-:tation of hill farming land. These are listed in a separate section as an appendix to the Act.

It would therefore appear that the long term demand for land by the Commission was not adequately considered and allowed for by the Ministers in allocating land for improvement under the Hill Farming Act, 1946, or for that matter under the Marginal Agricultural Production Scheme. This surely clearly demonstrates the need for a development plan for the Highlands so that the long-term allocation of land to farming and forestry respectively can be adequately planned and made so as to avoid duplication on improvement schemes and thereby waste of public money.

The tenant did stress that on Farm B the Department of Agriculture had been able to retain the most suitable areas for sheep rearing for hill farming purposes. Questioned on the movement of sheep and the value of shelter from and rides through the planted areas, he said, that on both farms the land did not lend itself to the movement of sheep "out and in" on a large scale. As to shelter, the various hefts[b] had their own natural areas for shelter and although these had been "threatened", the Senior Lands Officer was very much alive to their value and had protected them well in the meantime. He did not consider that the new plantations would have much shelter value for stock. They were rather more likely to take away from exist-:ing shelter as the tendency was to plant in sheltered areas. He further consider-:ed that shelter from trees was not of primary importance as the lie of the ground was such that there was quite a good deal of natural shelter.

One may conclude that the Department of Agriculture has been able to hold the balance fairly well between grazing and forestry. While it may be regretted that the Commission have acquired land for planting on a farm which was the subject of a hill farming improvement scheme, the writer was made aware of a growing feeling locally that forestry and hill farming need not necessarily be conflicting land uses but "can and should be made to harmonise." In Rannoch and Atholl, with a few notable exceptions, relations between the Commission and local farmers are fairly good and there is an indication that they are steadily improving. As one hill farmer suggested, "the Commission are beginning to appreciate our interests and us

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[b]Heft - A group of sheep which habitually graze within the confines of a particular area of hill ground, and also the area of ground itself. Each heft of ewes is self-replenishing. This is the definition of the term as given by the Hill Farm-:ing Research Organisation.

theirs. We are beginning to understand one another which can in the long run be only to the good of both industries."

Fig. 60 shows agricultural statistics for the four parishes which contain the Tummel Basin, at intervals between 1938 and 1960. Figures for Perthshire and for the whole country are given for comparison. When studying the statistics the writer would remind the reader that the geographical limits of the area under study are by no means synonymous with parish boundaries. Blair Atholl alone lies wholly within the area while considerable areas of the others lie outside it. It is also worth considering that the parish of Fortingall includes the hydro-electric schemes in Glen Lyon within its confines. Whatever the merits of considering the statis-:tics on a parish basis in view of what has been written - they are not available on any other basis except as individual farm returns - there is no evidence to suggest, whether the parishes are taken together or individually, that farming has suffered as a result of hydro-electric or forest operations in the area. While it is true that the acreage of improved land has decreased, both the numbers of sheep and cattle have increased and in each case at about twice the county rate. All four parishes are primarily hill farming country and consequently, have shared in the general prosperity of hill farming made practicable by generous Government subsidy and land improvement schemes. Perhaps most significant is the substantial increase in the number of beef cattle - store cattle - despite a decrease in dairy-:ing and the consequent lowering of the cattle/sheep ratio, which can but be of benefit in improving the hill grazings. Changes in the agricultural labour force will be referred to later.[a]

Private Forestry

On private estates it was refreshing to note that generally management approach was on the basis of farming AND forestry rather than farming OR forestry. On Bonskeid, for instance, which is a typical example, and which has 500 acres of produc-:tive woodland, forestry is being planned not only on the basis of sound timber

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[a] Page 385

production but also to obtain the best return from the surrounding agricultural land. Planting sites have been chosen judiciously with the dual purpose of providing shelter for stock and producing a final timber crop of real value in mind. Since the aim entails the production of good quality timber, blocks varying in size up to 90 acres are or have been planted, rather than pure shelter belts. The limiting factor in choosing a planting site is the ground available. General encroachment on the better grazings cannot be considered. Nevertheless, some good grazing ground has been planted with a view to making certain blocks commercially attractive from the timber point of view. This loss is more than compensated for by the ad-:vantages of the shelter provided.

On private estates like Bonskeid with their smaller woodland acreages, the integration of both forest and agricultural work has proved possible and has become a reality. In practice this has proved advantageous in the general running of the estate. While the Commission is somewhat similarly placed with respect to forest worker holders, the proportion of holders to that of the total labour force is un-:fortunately a small one, a fact noticeably so in the Tummel Basin.

On the Atholl Estates, the re-establishment of the forest cover in addition to providing shelter for sheep and cattle, has also proved of advantage to deer. Where light-demanding trees like the larch have been planted, the woods when in the pole stage - about 15 years old - can be opened to provide shelter for deer. This has proved beneficial in enabling a considerable survival of deer on the estates over the winter months. Not only do the woods provide shelter from cold winds but the lower branches provide a little browsing above the snow and also ground vegetation - a bite of early grass - for the snow cover clears first from under trees. This is to the benefit of both cattle and sheep which may be seen grazing side by side with deer. Spruce woodland on the other hand, with its pine needle "carpet" provides little grazing, but the low growing branches of the species pro-:vide earlier and better shelter.

In Glen Fender, where on one farm it is proposed to plant several blocks of trees on what is presently (1959) a bare hillside, it was considered that these

would offer substantial shelter to stock. The suggestion made is to plant three blocks which, though termed shelter blocks, are considered large enough to pro-:duce a crop of timber of real value. The sizes of the blocks are as follows.

Block No. 1 - length - 140 yards, width - 70 - 80 yards, area - 15 acres.
Block No. 2 - a square-shaped block of about 8 acres with the longest side about 80 yards.
Block No. 3 - a large rectangular block of about 80 acres.

Between blocks 2 and 3 there will be an open strip about 30 yards wide.

These blocks have been planned to give maximum protection from the prevailing wind and winter storms. When the trees are established the tenant is confident that he will be able to increase his present flock of 350 Blackface breeding ewes to 450, a matter which could not have been considered without the shelter provided by the woods. At present the farm also carries 40 - 50 head of cattle. It was suggested that while the extra shelter may make practicable an increase in cattle, this was unlikely since labour was difficult to come by.

The farm referred to is at an elevation of 1100 ft. while the proposed planta-:tions are even higher. The importance of shelter at this elevation needs little stressing. That the land is in good heart may be judged by a yield of 11 tons per acre from a crop of potatoes harvested the previous year (1958). The Scottish average is a little over 7 tons per acre. This example leaves little doubt that there is a place for forestry on our hill land and that by careful planning and integration, both forestry and the rearing of hill stock can be made to substantially increase output from such areas.

On some planting sites on the Atholl Estates, pure shelter belting has been resorted to because of the nature of the ground. These are worked purely as shelter belts and unless alternative shelter nearby is made available they will never be cut. But the great proportion of the planting is done for timber, which, during its growth will provide income, shelter and estate wood, and finally at matur-:ity, income and capital.

The examples related to serve to show that the private woodland owner is very much alive to the benefits which may accrue through the careful siting of plantations and through sound woodland management as necessitated under dedication.

Relations between private woodland owners and the Commission are most cordial and appreciation was expressed of the help given by the Commission, not only in giving advice on the numerous problems which may arise, but also in the lending of equip-:ment of various kinds so that schemes may be carried through as speedily and econ-:omically as possible.

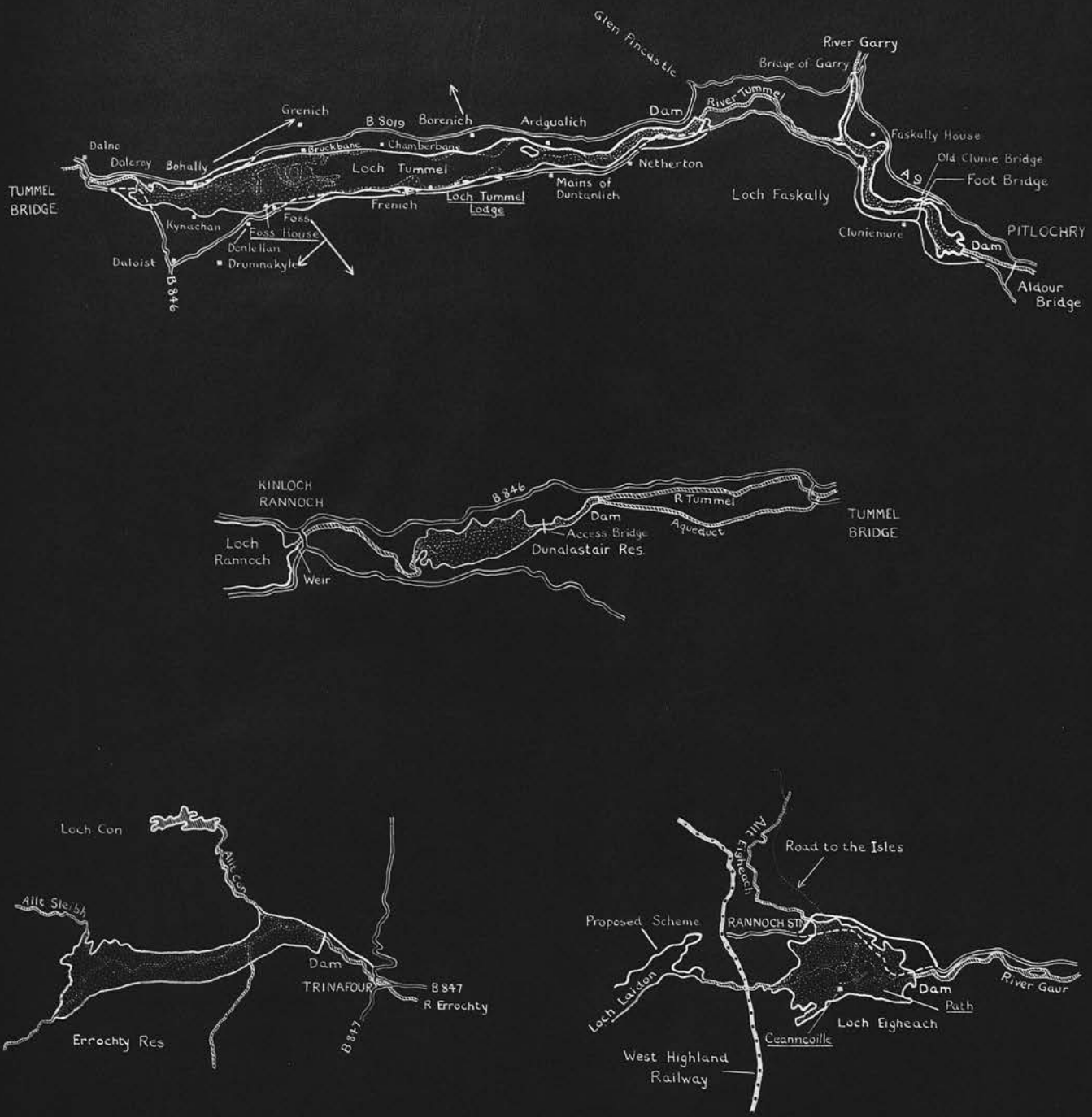

FIG. 59 TUMMEL BASIN - LAND AND PROPERTY LOST OR AFFECTED BY INUNDATION, AND ROADS LOST, DIVERTED OR RECONSTRUCTED IN CONSEQUENCE OF HYDRO-ELECTRIC DEVELOPMENT

FIG. 60 TUMMEL BASIN - AGRICULTURAL STATISTICS, 1938, 1948, 1954 and 1960

Year	Parish	Improved Land	Stock - Number of					Labour - Farm Staff						
		Acres Crops and Grass	Dairy Cattle	Beef Cattle	Total Cattle	Breeding Ewes	Total Sheep	Full-time Males	Full-time Females	Part-time Males	Part-time Females	Casual Males	Casual Females	Total
1938	Blair Atholl	5368	345	556	901	11697	24585	-	-	-	-	-	-	79
	Dull	4319	332	563	895	11948	25517	-	-	-	-	-	-	75
	Fortingall	3395	380	714	1094	23321	48258	-	-	-	-	-	-	133
	Moulin	3615	249	534	783	8056	17503	-	-	-	-	-	-	68
	Total	16697	1306	2367	3673	55022	115863	-	-	-	-	-	-	355
	Perthshire	317700	-	-	73928	288885	640301	-	-	-	-	-	-	6667
	Scotland	4560380	-	-	1315731	3383696	7969482	-	-	-	-	-	-	104340
1948	Blair Atholl	5583	210	1215	1425	14274	28868	-	-	-	-	-	-	93
	Dull	1713	321	866	1187	12489	25280	-	-	-	-	-	-	107
	Fortingall	3399	377	1145	1522	24202	45995	-	-	-	-	-	-	109
	Moulin	3151	205	682	887	8179	18201	-	-	-	-	-	-	85
	Total	13846	1113	3908	4921	59144	118344	-	-	-	-	-	-	394
	Perthshire	311717	-	-	85500	262984	558819	-	-	-	-	-	-	7693
	Scotland	4416752	-	-	1499243	2975401	6730664	-	-	-	-	-	-	117004
1954	Blair Atholl	5335	77	1440	1517	13459	27899	64	4	3	1	13		85
	Dull	2751	227	1005	1232	12493	24342	60	6	1	3	13	3	86
	Fortingall	3400	161	1180	1341	25552	48900	83	9		1	7	2	102
	Moulin	3139	263	688	951	8729	19394	50	9	2	1	3		65
	Total	14625	728	4313	5041	60233	120535	257	28	6	6	36	5	338
	Perthshire	309259	24384	72390	96774	276982	601842	5133	484	162	310	595	693	7377
	Scotland	4388436	805801	903890	1709691	3119843	7429375	67924	10105	2822	4228	7531	4750	97360
1960	Blair Atholl	5433	14	1845	1859	16137	35297	61	2	7	1	10	1	82
	Dull	3544	69	1513	1582	15116	31299	60	2	1		5		68
	Fortingall	3198	115	1617	1732	28760	60237	81	6	2	1	3		93
	Moulin	3184	271	1142	1413	8506	19290	53	2	3	3	5		66
	Total	15359	469	6117	6586	68519	146123	255	12	13	5	23	1	309
	Perthshire	305914	22418	98018	120436	318691	724477	4628	341	206	367	395	358	6295
	Scotland	4330138	761006	1241818	2002824	3561183	8407026	60206	6782	2902	4472	4817	3447	82626

PHOTOGRAPHS

139. Loch Tummel Lodge, South shore, Loch Tummel. (Courtesy H. Cook, Esq., Pitlochry).

140. Foss House and Policies, South shore, Loch Tummel. (Courtesy H. Cook, Esq., Pitlochry).

141. Foss House under demolition. (Courtesy H. Cook, Esq., Pitlochry).

142. Mains of Kynachan - South shore, Loch Tummel.

143. Bohally, prior to the raising of the level of the loch, North shore Loch Tummel. (Courtesy H. Cook, Esq., Pitlochry).

144. Bohally, after the raising of the level of the loch.

145. Swing Bridge, Bohally. (Courtesy H. Cook, Esq., Pitlochry). This bridge now crosses the River Garry near Blair Atholl.

Note: Phots. 139-145 bear witness to the changes which have taken place on Loch Tummelside as a consequence of raising the level of the loch through damming. The sites of Loch Tummel Lodge and Foss House are now under water, while at Kynachan and Bohally, the loch is now only a few yards away from the door. In each case considerable areas of bottom land, including considerable acreages of arable and grazing (Phot. 140 gives an indication of the quality of the land), have been inundated - a substantial loss to local agriculture.

146. Dunalastair Reservoir, near West end. The flooding of the haughs of Bunrannoch has resulted in a rather depressing picture. Schiehallion rises in the background.

147. Loch Tummel, West end. Mud, sand, shingle and reeds exposed when loch is at summer level.

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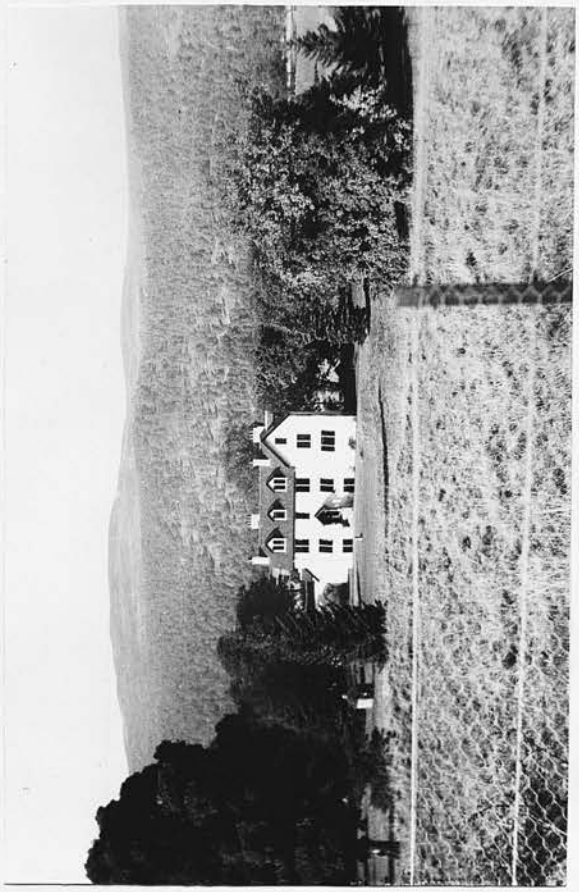

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CHAPTER 12

ELECTRICITY - ITS APPLICATION IN THE DAILY LIVES OF THE PEOPLE

In the Home and on the Farm

One obvious effect expected following the generation of hydro-electric power in the area is the electrification of all homes, farms and crofts. However, this is by no means the case, particularly in Strathtummel, and in this respect Northern Perthshire may be contrasted with the basin of the Beauly where, as inferred in an earlier chapter, almost every house and farm, no matter how remote, has a Board supply. Considering that electricity has been generated in the Tummel Basin for 30 years, it is surprising and it may be said regrettable that there are potential consumers in the area as yet unconnected.

Under the earlier scheme, the Grampian Company supplied the larger centres which included Pitlochry, Kinloch Rannoch, Tummel Bridge and Blair Atholl, but the Company's financial resources were not sufficient to withstand the heavy costs of bringing electricity to individual farms and crofts. Unlike the North of Scotland Hydro-Electric Board who are pledged to distribute electricity to remote areas where supplies would otherwise be an uneconomic proposition, the Grampian Company had no such policy, so by 1946, only a relatively few consumers, particularly those living in mansion houses and shooting lodges whose land was traversed by power lines had received a supply. Ardlarich farm is surely the supreme example of the failure, not only of the Company but of the laird alike, to see the advantages of a domestic supply, for this farm only about 100 yards from the Rannoch Power Station, received no electricity for nearly 20 years after the turbines began generating at the power house. It is on the other hand interesting to record that in 1946, the town of Pitlochry, with a population of a little over 2000, had 454 consumers, a consumption of 1,380,000 kW hours per year and a maximum demand of 448kW.[a]

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[a] See also Fig. 61.

When the North of Scotland Hydro-Electric Board assumed responsibility for all generation, transmission and distribution in the Company's area as a consequence of the provisions made under the Electricity Act, 1947, a considerable number of individual houses and farms received a main's supply. Yet between Tummel Bridge and Bridge of Garry only about one half of houses and farms have a main's supply. Why should this be? The reasons are complex but they might be summarised as follows.

When the North of Scotland Hydro-Electric Board first assumed responsibility for all generation, transmission and distribution in the Company's area as a consequence of the provisions made under the Electricity Act, 1947, the costs of labour and materials were substantially less than they are now and new consumers were connected free of charge, provided the consumer was situated less than half a mile from the distribution lines. But in 1948, mounting costs forced the Board to reconsider their rural policy of free connection throughout the North of Scotland District and from that year, new consumers, with the exception of those to whom free connection had already been promised, have had to pay part of the cost of bringing a main's supply. From 1948, new consumers had to undertake, during each of the first seven years from the date of connection, to use, or pay for, an amount of electricity equivalent to 10% of the cost of connection. In 1950 this guarantee was increased to 12½%. Later in the same year, charges were modified in cases where a number of consumers in a particular district were prepared to take a supply. Consumers in this category, however, had first to agree to undertake for the first seven years following the date of connection, to use, or pay for, electricity equal to £3 per annum per room and in the case of farm buildings, £3 per 1000 sq. ft. These charges were applied to all areas supplied by the mainland grid. In remote areas, mainly islands, supplied by diesel stations, guarantees were somewhat different.

In 1956, costs to the consumer were further increased. In addition to the seven year guarantee, the consumer was now required to make a direct contribution to the costs of connection. The Board were prepared to pay £23 up to a maximum of £200, for every £3 of guarantee, towards connection costs, but the consumer was now required to meet the difference between the actual cost of connection and the Board's

capital contribution. This payment which might be considerable depending on the location and distance of the consumer from distribution lines, could be paid either by lump sum or in instalments together with interest, over a period of seven years. This scale of charges is still in force for individuals or small groups of consumers other than those who can be connected for £200 or less. Previously, all new consumers living near distribution lines had to pay a service charge which entailed a fixed payment and a price per yard length of line. Now, all new consumers who can be connected for less than £200, can obtain a supply either by paying the appropriate service charge or by agreeing to pay for an amount of electricity (whether used or not) equivalent to 20% of the connection cost, the minimum charge being £26 per annum.

It may be added that since 1958, the Board have agreed to undertake rural distribution schemes in selected areas where a minimum of 60% of consumers are agreeable to participate and where the total cost per consumer does not exceed £500. Under this scheme, the domestic consumer is required to pay an annual guarantee of either £18 or £27 in addition to a capital contribution of either £45 or £55, depending on the size of his property. On farms, guarantees vary from £52 to £75 and capital contributions from £150 to £250. These payments may again be paid in lump sum or by quarterly instalments together with interest, over a period of seven years. Scales again differ in areas supplied by diesel stations.

Even summarised, the intricacies of costs and payments of bringing electricity to farms and crofts in the North of Scotland District seem formidable and the writer has no wish to become involved in a discussion of the merits and demerits of the Board's electricity charges. On returning to our area of study, it is peculiar to find that in Rannoch a considerably higher proportion of the population has an electricity supply from the grid than in the eastern half of the Basin. One may recall how earlier[a] mention was made that the farm of Mains of Dunfallandy, about 1½ miles from Pitlochry, had no electricity and this is by no means an isolated case.

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Two reasons are suggested which may help explain these apparent anomalies. These are:-

(1) Habitable dwellings in Rannoch are almost without exception close to the main roads. Since the main distribution lines tend to follow the roads, consumers can be fairly easily connected to the grid. Costs are, therefore, lower than in the eastern half of the basin where the total population, though larger, is much more scattered. Where farms are remote, particularly those inside glens, the costs of bringing an electricity supply are correspondingly greater. In Glen Fender, for instance, the cost of bringing electricity to a farm near the top of the glen is £2000 plus a guarantee of £65 per annum (1959 figures) for seven years. In such cases it is not the size of the holding but distance from the nearest supply line and whether there are other premises in the vicinity which may also benefit, which determine costs. In this particular case, a 50% grant, that is, £1000, might have been obtained under the 1946 Hill Farming Act, which makes provision for financial help for "the execution of works for or in connection with the supply of electricity for agricultural or domestic purposes". Since this still leaves £1000 to be paid by the owner of the estate over and above the guarantee required from the tenant, it is hardly surprising the farm has still no electricity. This example forcibly illustrates the financial difficulties involved in connecting a supply of electricity from the grid to remote premises.

(2) At the time of initial survey, it seems the demand for electricity in Strathtummel and Atholl was not as great as expected and consequently, many farms and homes remained unconnected. It is indeed difficult to pinpoint reasons for this but there may be a fair amount of truth in the following suggestions that (a) the value of a domestic supply of electricity was not fully realised, (b) estate owners were in some cases unwilling to incur costs in bringing electricity to tenanted premises, and (c) initial costs to be borne by the consumer were expected to decrease in the future but did in fact increase. An interesting example of (c) is provided by a sheep farm which lies about 200 yards from a double-circuit transmission line some distance south of Tummel Bridge. Originally the Board had agreed to connect the premises free of charge but

required a £90 guarantee for seven years. This offer was not accepted as there were rumours that the guarantee would be reduced in the next year or two. Instead, costs rose and in 1959, according to the farmer, the cost of installation was reckoned to be £800 - £850 plus a guarantee of £27 10/- for seven years. Most of the connection cost would be required to meet the cost of the necessary transformer. Consequently, a 2½kW, 6H.P. diesel engine [149] was purchased. This provides enough power to illuminate all lights in the house plus two electric fires, supposing all were switched on at any one time. There is enough power for television. If overloaded the lights dim, otherwise no harm results. And the running costs? One gallon of diesel oil per day - 1/5d. daily, or about £28 per annum.

It may be noted that the cost of diesel oil is about the same as the Board's annual guarantee, but while a main's supply of electricity would cost about £800 to instal, the cost of the diesel engine was only £285. Even allowing for wiring costs, this resulted in a considerable saving.

It may be construed that the answer to the problem of bringing electricity to rural consumers lies in the installation of individual diesel generators. But this is by no means so. In the case under study, the farmer agreed that if ever he wished to extend the supply of electricity on the farm and he may well have future reasons for doing so, he would first require to buy a larger engine. Although he had been fortunate until now, there was always the possibility of the engine breaking down at an inopportune moment. There was also depreciation costs to be considered and the present engine could not be expected to function indefinitely. From these considerations alone, the writer was left in no doubt that while the diesel engine was a useful stop-gap, the farm would undoubtedly have been better off with a main's supply.

One must sympathise with the small farmer and householder whose means or perhaps other circumstances, may not have allowed him to partake of the initial advantages which were offered in procuring a main's supply. Into this category one must also include those who have come into the area in the intervening period and who seemingly have no chance of obtaining an immediate electricity supply. For them it is unfair

to ask for such large contributions when in the past others were charged substantially less or nothing at all for the same service. While one must remain unbiassed and objective in this study, there would seem to be a certain degree of irony in a situation which allows so many people close by the source of seemingly unlimited power supplies to go without, while that power is transmitted scores of miles away to light the homes of families in towns and cities in the Lowlands. What of the farmers who suffered the loss of much of their best land through inundation to make possible the generation of this power? Must they remain for ever in the Stygian gloom of the 19th Century paraffin lamp? Around Loch Tummelside, particularly along the south shore where the losses of land have been greatest, relatively few farms and houses have a power supply. Many consider that a supply of electricity should have been installed as part of the compensation paid by the Board in lieu of the losses of land incurred.

Electricity is no longer a luxury in rural areas as it was in 1945. The advent of television and the vast assortment of labour-saving electrical appliances - cookers, kettles, fires, washing machines, refrigerators - make an electricity supply a "must" in every home. As inferred elsewhere, electrical power can also be used to advantage on the farm.

The Board cannot be blamed for the present unsatisfactory array of unconnected premises. With increasing costs and their statutory duty to pay their way it was not unreasonable that they should have found it necessary to increase connection costs and institute annual charges for electricity supplied, in order to secure a guaranteed revenue for seven years.[a] One must also consider that initially it was primarily the nearest and "easiest" consumers who were connected and that as time passed, the Board were faced with bringing a supply to an increasing proportion of the more remote dwellings, farms and crofts throughout their area of supply. Further, despite this

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[a] The writer is not, however, convinced that a scale of charges on the number of rooms in a house is the fairest way to raise revenue to offset costs. This is an anomaly about which there has been much protest and one which ought to be removed.

burden, their tariffs are broadly in line with other Area Boards. Yet, surely it is wrong in principle to deprive any potential consumer of the advantages of electricity on financial or any other grounds. In terms of the provisions made under the 1943 Act, the aim must be 100% connection and if the Board has not the finance to meet the cost, then Government subsidy must be provided.[a]

One of the reasons for depopulation in rural areas is the unfavourable comparison between the countryside and town in respect of the services and social amenities provided. Electricity is one of the essential services and thus the provision of an electricity supply to all rural dwellings is a prime and pressing necessity towards easing the Highland problem.

During the preparation of "The Tay Valley Regional Plan"[150] in the immediate post-war period, a questionnaire was prepared and forwarded to local Highland districts to assess the adequacy of existing social services. The need for an electricity supply or extension featured high on the returns. The results were:-

Recreational facilities or playgrounds wanted or in need of improvement	121
Bus services provided or in need of improvement	115
Local industry required (alternative to agriculture)	114
Electricity supply or extension	106
Village halls (including cinemas and libraries) required or in need of improvement	80
Water supply provision or improvement	77
Housing demolition and new housing	49
Improved local shopping facilities	16
Sanitation provision or improvement	15
Better education facilities	2
Need for refuse collection	2
Better street lighting	2
	699

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[a] Persuasion from the right quarter may sometimes seemingly achieve the impossible. A house within 600 yards of one of the power stations in the Tummel Valley had no electricity, neither was there the prospect of a supply unless the householder paid for the necessary poles to carry the power line together with a share of the installation costs. This was rejected. Some time later a film company were shooting scenes of the Board's work in the area and of the advantages of electricity to the local inhabitants. They got to learn of the house seemingly "so near and yet so far" from an electricity supply. As a result within a week the Board had agreed to pay for the poles and instal a supply free of charge, their only requirement being that the householder be agreeable to a guarantee of £7 10/- per annum. This was gratefully accepted.

With the electrification of the area less advanced than expected, it was not surprising to learn that electricity is not widely applied in agriculture. According to one very knowledgeable local farmer, there were no electric grain or hay driers in commission in the area in 1959. A number of farms, however, do have diesel driven electric motors for threshing. It may be that the losses incurred through flooding and the uncertainties following the Commission's acquisitions made farmers cautious of adopting new innovations in electrically driven farm machinery until they saw what the future held for them. Perhaps the sixties may witness greater advantage being taken of electricity.

Undoubtedly, the wider application of electricity to local farming would be both a great boon and blessing. Recently, a new technique in hay making known as "barn" hay making, that is, hay baled in the field and dried in the barn by electricity, clearly demonstrates the advantages of the new method over the old. The advantages of better and more easily procured winter feed need hardly be emphasised in an area primarily devoted to the rearing of stock. Of course, as in Strathglass, sheer economics may hinder the expected application of electricity to agriculture unless individual farm units or estates (most farms are tenanted) co-operate in adopting modern equipment and techniques. Considering the expansion of tourism, one might have expected dairying, with all the milking, cooling and bottling done by electricity, to have developed as an economic proposition, say in the Tummel glen. In fact, after the late war, dairy herds were established at Ardlarich (near Rannoch Power Station), Annat (six miles further east), Dunalastair Home Farm and Ballinealich (Glen Fincastle). These herds were well placed to meet the needs of the whole valley, yet today, nearly all milk is imported. Apparently it is cheaper to import milk from the Lowlands than to produce it locally, a fact ably supported on comparison of the numbers of dairy cattle in the basin over the post-war period.[a]

Similarly, pig and poultry farming lend themselves to electrical application but again fluctuating market prices, as in recent years, have not been conducive to their

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[a] Fig. 60.

establishment and/or expansion in areas like Northern Perthshire, which are remote from markets and consequently, have to bear freight charges.

Despite the difficulties weighted against Highland agriculture, electricity can and must come to play a dominant role in the farming economy. Its economic adoption will hasten changes in traditional methods which may not at first be welcomed by a people who are themselves by tradition slow to change. But if hill farming is to remain visible in the face of ever increasing competition, not only from the more favoured areas of the home country, the Commonwealth, and perhaps also the Common Market, then changes, including the wider use of electricity in all branches of agriculture, which can help attain this end, must be considered and applied without further ado.

Tourism

Earlier, under Amenity, reference was made to the boost given to the tourist industry by the Board's schemes. Tourism was also referred to under Fisheries. With regard to the general benefits of electricity to the tourist industry, the reader is further referred back to pages 187 and 188.

Last year (1961), 609,032 persons[a] stayed in hotels, boarding houses and "bed and breakfast" establishments in the counties of Perth and Kinross. This was not only a record but the figure was second only to that of Edinburgh. No figures are available for the Tummel Basin alone but the following statistics give an indication of the popularity of Pitlochry.

In 1961, the Pitlochry Tourist Association listed 29 hotels and board residences and 37 private houses offering tourist accommodation in the burgh. The accommodation offered could sleep 1119 people. In addition, the burgh provided 150 pitches for caravans and 160 pitches for tents, most of them being on the camping sites at either end of the town, and offering accommodation for an estimated 600 people per night. In spite of the provisions made, "Site Full" or "House Full" notices, are by no means uncommon at the height of the tourist season and visitors may have to seek accommodation elsewhere.[b]

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[a] Source - Scottish Tourist Board

The value of electricity in the promotion of the tourist industry is perhaps most clearly demonstrated by a visit to one of the camping sites on the outskirts of the town. The Milton of Fonab Caravan Site[150] is situated in a large field by the banks of the Tummel as one approaches the burgh from the south. The site may most conveniently be reached by crossing the new Aldour Bridge erected by the Board in 1950. The land is rented from a local farmer by a Mr. Craig who hails from Airdrie. Having foreseen the need for a first class camping site for tents and caravans to meet the needs of the rapidly expanding flow of tourists into and through the area - the number of holiday caravans on roads throughout the United Kingdom has expanded severl times over in the past decade - his business is now a booming concern. Charges in 1959 were 3/- for caravans and 2/6d. for tents, both per night. The same year a wooden shop was erected to supply the many necessities required by caravaners. Considering that thenearest shops in town are more than a mile away, the shop has proved a great blessing to visitors and trade has been so good, that before the commencement of the 1961 season, the store was extended.[a] Occupying pride of place in the shop is a large electrically operated deep freeze,[152] which has proved advantageous in keeping supplies of perishable foodstuffs fresh over the weekends when demand is greatest. Electricity is also made use of in the toilets by way of electric power points so that those who wish may make use of their electric shavers.

Without doubt, the camp site could never have developed to the same extent if a power supply had not been available. Business is so good that in winter the proprieter can afford to holiday off the earnings of the previous summer.

Further west at Tummel Bridge, a petrol station,[153] tea room and caravan park, has been opened by the former owner of Dalno to meet the requirements of the tourist industry. Being at a crossroads, Tummel Bridge is an excellent location for such an enterprise. Electricity again plays a big part in the success of the venture but without state forestry it is doubtful whether this venture would have been begun at all.[b]

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[a] Compare with similar developments at Cannich, see page 189 .

[b] Page 342 .

A local sailing club was formed on Loch Tummel in 1960, the privilege to use the loch having been eagerly granted by the Board. Experts maintain that the increased size of the loch through damming has made the loch more suitable for this sport than formerly. The tenant of Foss Home Farm played a prominent part in the establishment of the club. More recently, pony-trekking has been commenced while there are at present (1961) plans to establish water skiing on Loch Tummel. Pitlochry hoteliers are also alive to the possibility of establishing the burgh as a winter sports centre with access to the Glen Shee (Devil's Elbow) ski slopes and later, to the development of a similar ski centre on the slopes of Beinn a' Ghlo.

The reader will be aware that the area is very much alive to and is already reaping a substantial income from tourism. While it is quite impractical to assess accurately how much the operations of the North of Scotland Hydro-Electric Board have contributed to the tourist industry by the various attractions provided by the dams, fish ladders, new roads, new fishing grounds (Loch Faskally) and through the application of electrical power in a miscellany of ways, their contribution has undoubtedly been considerable. Perhaps most important of all, the Board have made practicable greater advantage being taken of tourism to the subsequent benefit of local trade and to the economy in general, and which will further increase, if and when, the remaining premises in the area are connected to the grid.

Non-Residential and Industrial

Generally, electricity is widely applied by both the non-residential and industrial consumer in the basin. Schools, churches, offices, banks, shops, garages, etc., all benefit from electric lighting and heating. While the Tummel Basin cannot claim industrial distinction, a number of small but important industries do exist. The largest industrial consumers are Macnaughton's Tweed Mills (Pitlochry), Bell's Distillery (Pitlochry), Whitley's Distillery (Pitlochry), a laundry (Pitlochry), Shierglas Limestone Quarry (Blair Atholl), and until recently (1962), the Forestry Commission's Directorate Workshop (Blair Atholl).

Macnaughtons demonstrate the change over from diesel to hydro-electricity. A supply was not obtained from the earlier Grampian Company because of the cheapness

of diesel fuel, but later in 1948, as the diesel generators depreciated in value, an approcah was made to the Hydro Board for a main's supply. For various reasons, the change over was not completed until 1953. The firm carry on a large export trade in both woollens and tweeds. They employ 30 people in the mill[a] together with another 30 in the adjacent skirt making factory and shop in Station Road.

McLellans - a welding and repairing business - in Ferry Road, is an example of a small rural industry which, with modern electrically driven equipment powered by hydro-electricity, has been able to expand considerably in recent years. The business now does welding and other repair work formerly done in Perth or Dundee. They also do work for the Board. Not only is the business able to compete favourably with its city counterparts, but it fulfills the important secondary role of providing employment locally in this field.

At the boathouse by Lock Faskally, Mr. H. Sands, who also leases the fishings on the loch from the Board, has begun a small boat building business. Although the initiative for starting the enterprise must solely belong to Mr. Sands, there is no doubt that without the electric power to drive the lathes and, of course, the creation of Loch Faskally in the first place, there would be no boat building on the site today. Originally the owner of the business had opened a tearoom but owing to the inclemency of the weather, this enterprise was discontinued and he turned to boat building instead. The affluent society has created a demandfor boats - the boat being the status symbol of the sixties just as the car was in the fifties. Most of the boats are sold outside the district particularly for sailing on the Clyde. Surprisingly, local wood is not used in construction, most of the wood apparently coming, for reasons of quality, from Loch Lomondside and Nairnshire. Two men are employed.

An unusual development for Northern Perthshire has been the establishment of a small car polish making factory at Kinloch Rannoch by the Rollo-Di-Atom Co., Ltd.

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[a] By sending wool to be spun in the Hebrides, Macnaughtons help to provide ancilliary employment for crofters.

The polish is made from diatomite - obtained from the bed of Loch na Cuilc on the island of Bernera which lies off the west coast of Lewis - emulsified wax, silicone and other ingredients. Formerly, the diatomite was mined and exported from Uig in Skye but the company which operated there has since closed its doors. Although Bernera is further away, the deposits are reckoned to be among the purest in the world and are dug by local crofters working on a part-time basis. Diatomite is composedof the minute skeletons of algae and other microscopic animal and vegetable life of a bye-gone era. The actual processing of the diatomite with wax, silicone and other ingredients, takes place at the Kinloch Rannoch factory. About half-a-dozen women are employed in the making of the polish which is marketed in 10 oz. tins, priced 5/- each, and known as "Highland Island Di-Atom Car Polish". The polish markets well in North America but little is sold in this country. Whatever the reason - perhaps because of the great competition in this field from the better known makes - the author believes it could be more widely and better advertised. In fact on a number of occasions, he has been unable to buy it other than in Kinloch Rannoch.

Why establish a car polish factory? There would seem to be no specific reason other than perhaps the need to provide a new industry in an area entirely dependent on forestry, agriculture and tourism for employment. Mr. J.M. Rollo, owner of the parent works of the Rollo Di-Atom Company at Bonnybridge, is noted for a number of small miscellaneous enterprises in the Highlands which are providing work, often ancilliary employment, in places where such is needed.

At Croft Douglas on Loch Tummelside, an Englishman - Mr. Gideon Scott-May - fashions model animals from stone found locally. A continuous stream of tourists visit his small workshop and showroom during the summer season. The success of this venture gives rise to the question - might not hydro-electricity be more widely applied in this area in the making of Scottish souvenirs? Must tourists continue to buy mass-produced "Made in Birmingham" articles north of the Highland Line? The demand is there. Considering the help which may be given both in terms of advice and finance by the Scottish Country Industries Development Trust for the promotion of rural industries of this type, a golden opportunity would appear to exist for men and/or women with the necessary enterprise and initiative.

A number of electrically operated saw mills operate in the basin, some by contractors and others by extates with large stands of timber. The application of new power in place of the old is clearly demonstrated at Camusericht, near Bridge of Ericht, and by the mill on Bonskeid Estate.[154,155] [156,157,158] At Blair Atholl Sawmill (Atholl Estates), machinery of 40 H.P. is installed and is powered by hydro-electricity.

What of industrial trends? We have made note of the major industries operating in the basin. Some are new but the majority are long established and have simply switched over to a main's supply. Considering that power to the quantity of 600 million of units per annum is produced in the basin, is there the possibility of new industry being established in the future? What of forestry? Are the afforestation projects, particulary state forestry, likely to hold forth prospects of employment in wood processing plants? These questions will be considered later once the social implications of hydro-electricity and forestry have been aired.

FIG. 61 THE GRAMPIAN COMPANY - GROWTH AND DEVELOPMENT (1930-46)

	1930	1946
Capital Expenditure	£1,830,862	£7,559,900
Generating Station Capacity	23,635kW	97,751kW
Load Connected	24,000kW	176,715kW
Maximum Demand	14,511kW	80,000kW
Average Cost of Coal per ton	15s 8d	46s 4d
Gross Revenue	£32,998	£963,155
Number of Units Sold	7,934,483	273,576,383
Number of Units Sold excluding sales to the Central Electricity Board	3,597,083	188,507,778
Number of Units Sold excluding all Bulk Supplies	1,169,610	112,626,276
Revenue from Sale of Electricity	£32,643	£952,608
Revenue excluding sales to the Central Electricity Board	£25,956	£876,634
Revenue excluding all Bulk Supplies	£15,340	£638,028
Average Price per Unit Sold	0.99d	0.84d
Average Price per Unit excluding sales to the Central Electricity Board	1.73d	1.12d
Average Price per Unit excluding all Bulk Supplies	3.16d	1.36d

Further information with regard to the Company is given on page 66.

PHOTOGRAPHS

148. Electricity Power Lines, South of Tummel Bridge, about 200 yards from a sheep farm without electricity.

149. Electricity Generation by Diesel Engine on a sheep farm South of Tummel Bridge. The engine, which cost £285, generates $2\frac{1}{2}$ kW. from 6 H.P. at a running cost of about £28 per annum.

150. Milton of Fonab Caravan Site, Pitlochry.

151. General Store, Milton of Fonab Caravan Site.

152. Electric Deep Freeze for Fresh Frozen Foods, General Store, Milton of Fonab Caravan Site.

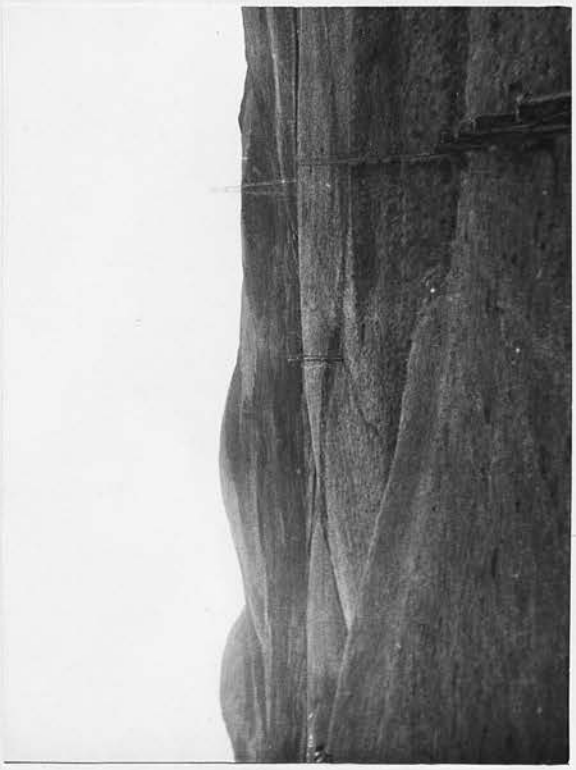
153. Petrol Filling Station and Store, Tummel Bridge. The proprietor, formerly a sheep farmer, commenced this business after selling his land to the Forestry Commission for planting.

154-155. Old and New Power, Camuserich Sawmill, Rannoch.

156-157. Old and New Power, Bonskeid Sawmill, Lower Tummel Gorge.

158. Electricity Transformer, Bonskeid Sawmill.

Note: Phots. 154-158 bear evidence of the replacement of traditional methods of producing power by hydro-electricity.



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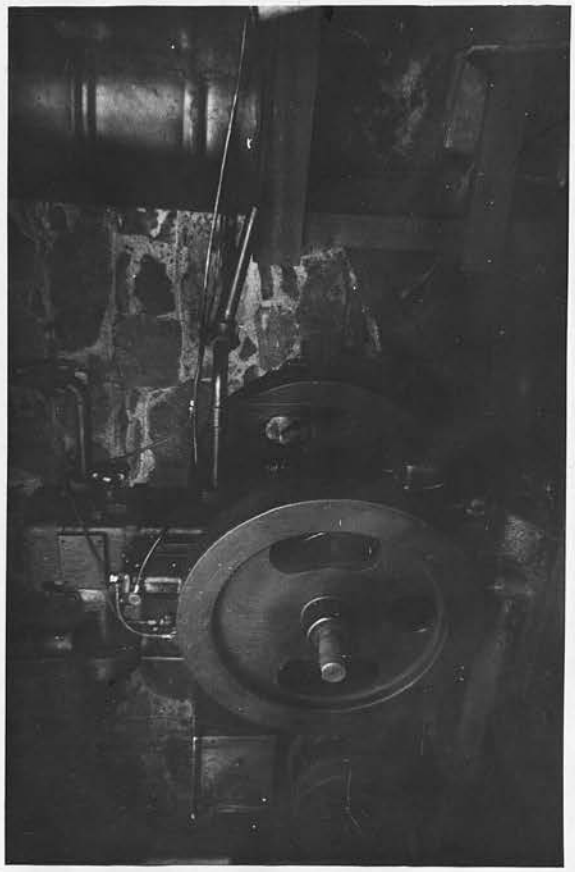

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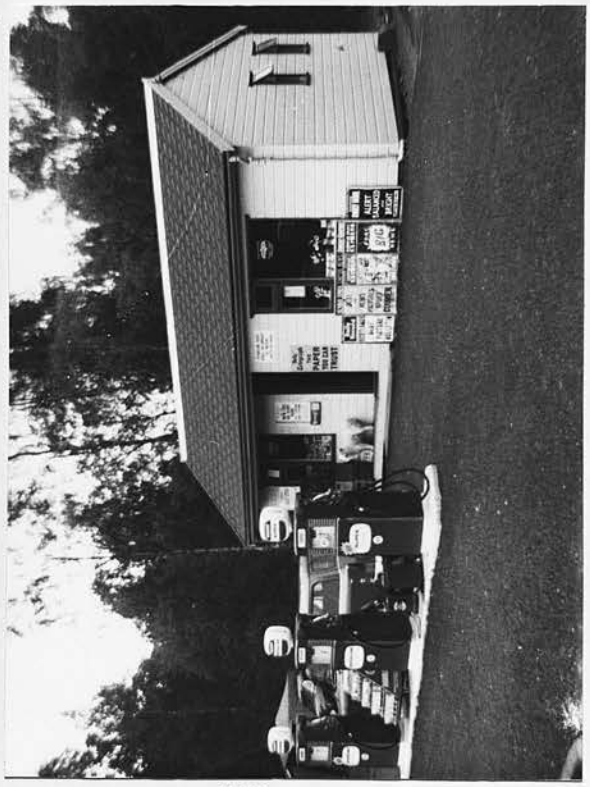

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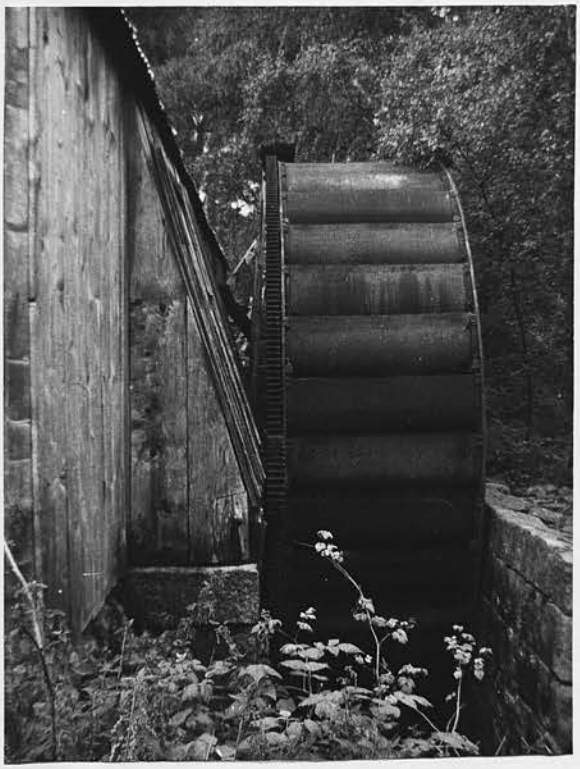

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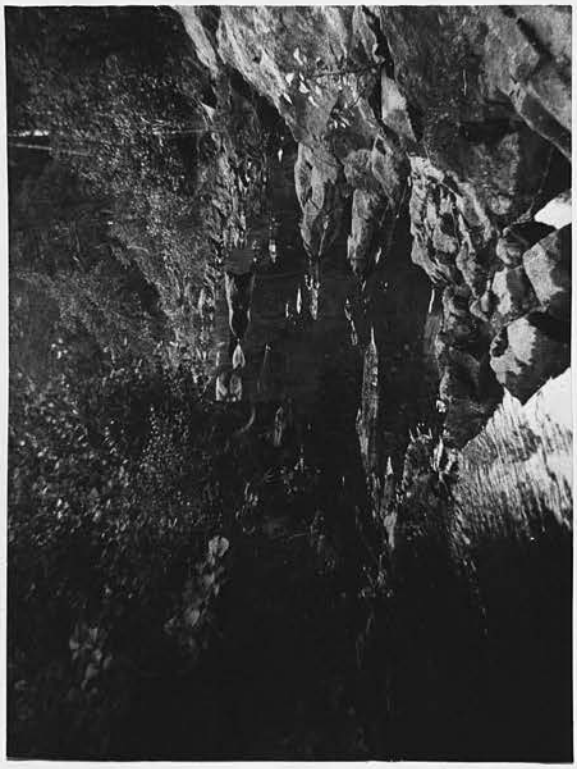

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CHAPTER 13

HYDRO-ELECTRICITY AND FORESTRY - THEIR SOCIAL IMPLICATIONS

Hydro-Electricity

"The human side is also interesting. The first sod was cut and the first bit of granite broken in September 1928, and varying numbers of men have been employed on the job according to the work in hand. At present there are about 1000 hands employed. The camps for the men suggest 'Back to the army again, sergeant.'. The only thing they don't possess is an Orderly Room. But there are huts and tents, dry and wet canteens, a hospital, a barber's shop and a huge recreation hall where you can play billiards and watch a cinema. Of the men employed over 82% are Scots and half of these are men of the Western Isles. It is found that the Islesman is the best worker but he has that racial tendency that when he has worked a certain period, he must go off to see how his croft is getting on. This makes an interesting parallel with what is wrongly called 'desertion' in the days of the Highland army. The period of service in the field which the clansman had to give was 40 days. At the end of that time he was naturally anxious to know how things were going on his croft (he was a one-man business) and so he cleared off - and history calls it desertion.

A Roman Catholic chapel built on the spot by the workmen and the priest pays eloquent tribute to the organisation and power of that persuasion.

Wild things have come out of the Badenoch hills. Many a place has been lit up by blazing homesteads set on fire by Badenoch's Wolf. But new power is brought out of it to light up in peace 4000 sq. miles of Scotland."63

These words written 30 years ago give an indication of the men and the life in a hydro-electric construction camp.[a] Nearly two decades later hydro construction camps once again became a feature of the glens of Rannoch and Atholl as hundreds of men employed on the Tummel-Garry Scheme were housed in camps at Clunie and Glen Errochty. Once more the old Grampian Company camp and depot and Tummel Bridge hummed with the noise of men and machines. More recently, a small camp was established on Loch Erichtside to house workers employed on the construction of the new power station at the outfall of the Garry Tunnel. Should the Board be given powers to proceed with their proposed Laidon Scheme, another small camp is likely to become established in Rannoch.

Although accurate and detailed figures for local labour are not available it is estimated that probably 85% of the labour employed, particularly that which was

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[a] Refers to the construction of the Loch Ericht dam.

engaged in work on the Tummel-Garry Scheme, came from outside the area. Unlike the earlier Grampian scheme just described, the proportion of Scots engaged in work on the post-war hydro developments, though still fairly high, was considerably less. This may be attributable to the fact that the earlier Grampian schemes were carried through in the midst of an economic depression and in consequence of the high percentage of unemployment, it followed that most of the labour recruited for this work came from the home country. But things were radically different after the war. Britain was undergoing a wave of reconstruction to make good both war-time damage and work which had been postponed because of the war. Hydro-schemes, therefore, had to compete with other construction work for labour, unemployment was relatively low and consequently, much of the recruitment was in the form of Irish labour with a fair sprinkling of displaced persons from Europe, notably Poles.

A parallel may be drawn between the Irishman and the West Highland and Island Scot as described overleaf. Labour turnover on the post-war schemes has been high but for different reasons - not to attend to the needs of the croft back home but because of the inherent wanderlust which seems to be embodied in the make-up of all Irishmen. The average Irishman never stays long in one job unless he is an excavator or bulldozer driver and then he will stay only as long as he can have his machine. Suddenly he will be up and gone one morning to wherever his fancy takes him, be it to Glasgow or perhaps on a long hike away down to England or Wales.

During the long summer vacation many students from universities and colleges throughout Britain, have found labouring on hydro-electric construction work to be a profitable holiday job. They are generally regarded by the Irishmen with amused tolerance.

Fig. 62 shows the run-down in labour employed in hydro-electric construction work in the basin since 1950 as work nears completion. Already most of the men and machines have gone. This prompts the question - is hydro-electric development just a passing phase providing temporary employment primarily for a large influx of population which, after the work on the various schemes nears completion, will gradually melt away, or, does such development hold forth real prospects for permanent employment and repopulation in the basin with the consequent benefits which will ensue to

the local economy? One might go further and query what happens to those local men employed when the work is completed. This latter question cannot as yet be fully answered for the problem of finding alternative employment will not be fully realised until all work on the present hydro schemes in the area is finished.

Let us first consider the pre-war Grampian scheme. Contemporaneously with the run down of workers on the temporary camp sites, the Company erected 15 permanent dwellings to house the staff required to man the Rannoch and Tummel power stations. 6 houses were erected near Killiechonan about ½ mile east of the former station and another 9 at Tummel Bridge close by the site of the latter. The half dozen "Loch View" houses at Killiechonan are of a semi-detached bungalow type 159 with extensive views across Loch Rannoch and have attractive gardens running down to the roadside. They are built on the site of a former 19th Century crofting community.[a] At Tummel Bridge, the houses are of a double storeyed semi-detached type 160 and resemble the type of house commonly found in certain suburban, inter-war housing schemes. They are sited along the B846 between the old Wade Bridge over the Tummel and the power house. Like the power station they still partially retain their old war-time camouflage of paint. Both sets of houses are attractively designed, brick-built and harled.

The North of Scotland Hydro-Electric Board built or acquired - excluding those acquired from the Grampian Company and just described - 54 houses for their permanent staff in the basin. 42 of these - 32 stone and 10 timber, including temporary houses - were built by the Board, the remainder being mainly ex-estate stone built cottages. The location of these and the Grampian built houses are given in Figs. 63A, 68A and 68B. There is also a semi-permanent camp located at Tummel Bridge.

To meet future needs the Board have plans to build a further 8 houses at Tummel Bridge and 1 at Dalwhinnie. The replacement of the 4 temporary wooden houses in Ferry Road, Pitlochry, is also contemplated.

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a Pages 50 and 51

161, 162

The Lettoch and Parkcroy developments in Pitlochry are among the finest of the Board's housing projects. Like Cammich, the sites are well laid out while the houses themselves are stone-built, well-designed and very comfortable. As expected, heating, lighting and cooking is done by electricity although most, if not all of the houses, have one room with an open hearth. Centrally placed to the whole scheme at Lettoch Terrace is a low building providing lock-ups for cars. The scheme has a south-west exposure and commands extensive views southwards of the Tummel - Tay Valley as far as Dunkeld. To the north-west the ground rises towards Craigower and Ben Vrackie. Undoubtedly, the site is one of the finest in Perthshire and it hardly is surprising to learn that hydro employees elsewhere keep an ever watchful eye for any vacancies which may arise in Pitlochry.[a]

Excluding men employed temporarily on construction work at Loch Ericht and elsewhere, the Board had 95 persons on its permanent staff in the Tummel Basin in June 1960. These were distributed as follows.

	Generation Engineer's Staff.	Research Engineer's Staff.	Central Control	Total
Managerial	2	1	1	4
Technical	25	2	10	37
Clerical	1	1	1	3
Manual	49	-	2	51
	77	4	14	95

In August 1960, the writer undertook a census of Board employees and dependents. The results are tabulated in Figs. 63A and 63B.

State Forestry

As elsewhere, the establishment of the forest cover made imperative the construction or acquisition of houses for Commission staff and workers. The Commission have at present (mid 1960) 65 houses (includes 1 flat in Farkally House) and 2 hostels in the basin. Excluding the houses and hostel for staff and workers employed at the

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[a]

Directorate Workshop (in existence in 1960 but now defunct), accommodation is reduced to 50 houses and 1 hostel. Unlike Strathglass, where geographical conditions favour the centralisation of workers at Cannich, houses are scattered individually or in groups of two or three,[164] with the exception of the larger groupings at Kinloch Rannoch and Trinafour.

As in the Beauly Basin, state afforestation is a relative newcomer into the district, so both the numbers of employees and houses are expected to increase in the future. An unspecified number of houses are planned for Tummel Bridge, probably because of its central position in relation to Allean, Glen Errochty and Rannoch (East) forests. Houses may also be built at Kinloch Rannoch and at Bridge of Gaur. The Commission also have plans to add to the present number of holdings.[a]

In mid 1960, 86 persons (including 9 women) were employed by the Commission in the Tummel Basin. This figure excludes students at Faskally, but includes instructional and domestic staff at the school and those employed at the Workshop at Blair Atholl. If the Faskally and Workshop employees are excluded, the number employed directly in state forestry is just under 60. This latter figure includes 4 foresters and assistant foresters and 1 clerkess (at Rannoch).

The writer conducted a census of Commission employees and dependents in August, 1960. 267 persons were recorded. This figure included students for the current session at Faskally House together with those employed at the Workshop. If these are excluded, the number is reduced to just under 200.[b]

Private Forestry

Considerable difficulty was experienced in obtaining information with regard to the number of forest employees and dependents in private woodlands. Since the bulk of managed woodland is on estates which have considerable acreages of dedicated woodland, observations were limited to those estates.[c] Some estates willingly

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[a] Reference to this is made on page 330 .

[b] Fig. 64A.

[c] Fig. 58.

provided the writer with the necessary data, others provided information only on condition that it was used confidentially, while others again for private reasons, were unwilling to divulge any statistical information. For these reasons the writer did not conduct a personal census of estate employees and dependents but rather gained the necessary data through personal or written contact with the factors of the estates concerned. In consequence of the confidential nature of much of the information gathered, it was decided to group this information together in tabular form. As shown in Fig. 65A this has been done for five of the largest estates which represent 95% of the dedicated woodland. These estates, which represent 7100 acres out of a total of 7500 acres of dedicated woodland, together with an unspecified acreage of other woodland, employed 34 persons (32 males and 2 females) full-time, and 3 others (all men) part-time in forestry. Together with dependents, 90 persons were supported by forestry. These statistics pertain to August, 1960.

By courtesy of Mr. R. S. Barbour, to whom the writer is indebted, figures for Bonskeid Estate are shown in Fig. 65B and give an indication of the numbers employed and their dependents on an individual estate.

On the remaining dedicated estates it is estimated that perhaps another 10 - 15 persons are supported by forestry. On other estates (not dedicated) it seems unlikely on the basis of information gauged from elsewhere that any full-time foresters or forest workers are employed. Owing to the small woodland acreages involved, planting and woodland management is almost certainly to be done by estate employees whose main vocation is agriculture or by contract labour.

Analysis of Population Trends

Hydro-electricity, state and private forestry together, support at least 602 persons[b] in the Tummel Basin. This figure represents over one-ninth (11.8%) of the estimated total population resident in the basin which was estimated in 1960 to be

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[a] The term "full-time" refers to employment two-thirds or more in forestry.

[b] With regard to private forestry, only the figures for the five estates given in Fig. 65A are included.

5057, the figure being reached as a result of careful analysis and calculation based largely on figures obtained from the officers of the various electoral districts. The statistics shown for Rannoch and Foss Districts,[a] that is, the Tummel Valley, were obtained as the result of an actual census. The total for Blair Atholl parish, 980, was obtained by subtracting 241 - the number of people resident in the Foss District of the parish and obtained as the result of an actual census - from an estimated figure of 1221 for the whole parish. This latter figure was calculated using Barclay's method[7] - in this case, 921 (electors) + 2 x 150 (school children, 5 - 15 years of age). The electoral registration officer estimated the parish population to be 1200. Pitlochry was estimated to have 2500 people - the 1961 census gave a figure of 2501 - while a figure of 250 was estimated for that part of Moulin parish, excluding Pitlochry, lying within the basin. In tabular form the figures obtained were as follows:-

Rannoch District	979
Foss District	348
Remainder of Blair Atholl parish	980
Pitlochry burgh	2500
Moulin parish (part of)	250
Tummel Basin	5057

A striking feature of both the hydro and forest populations is that they are comparatively young, this being exemplified by the high proportions of young adults (15 - 44 age group) and children, and again, by the proportions of children to adults. The differences between Rannoch and Foss are worth comment. Figures for the non-hydro and forest inhabitants in Rannoch bear evidence of an ageing population which seems due to the relative remoteness of the western district, which in turn has prompted a drift away of the younger and more virile element in the population. In terms of population the Commission's afforestation programme and the Board's developments can be described as most welcome additions to the district.

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[a] Fig. 66A(i).

Although information as to the age structure of the population resident in the basin immediately prior to hydro and forestry development was lacking, there is evidence from the school roll[a] that the age structure is healthier today than formerly. One might conclude that the trend towards an ageing population has been retarded. While this is primarily in consequence of the influx of a younger hydro and forest element, the explanation, in part at least, is due to the increase in the birth rate which took place in the years immediately following the cessation of the Second World War. The younger age groups - mainly school children - are thus inflated. If statistics were available, we would find that their expansion had had the effect of reducing the proportion of adults, in particular, those in the older age groups.

Demographically the Tummel Valley provides an interesting study. Already the hydro and forest populations account for 23.1% or nearly one-quarter of the total population. In the eastern half of the valley (Foss District) the proportion is even greater and exceeds 80% in Tummel Bridge, a village which owes its present size, importance and character to hydro-electric development. In Rannoch the percentage is only 15.9 but will increase as the state forest programme in Rannoch gains momentum.[b]

No figures are available as to the proportion of locals employed in hydro-electricity and forestry in the basin, but with the exception of private forestry, there is evidence that the numbers of locals employed by the Board and the Commission are small. For instance, in Allean Forest, only 1 man in 8 employed was local; in the Commission's housing scheme at Kinloch Rannoch only 4 men out of 12; and at Rannoch Power Station, only 1 man out of 12 could be termed as local. Therefore, the majority of those employed in hydro-electricity and state forestry are incomers and may be said to constitute a net gain of about 10% to the total population.

Has the drift of population away from the basin been stemmed as a result of these developments? Again the author was faced with the difficulty of having no accurate

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[a] Fig. 67

[b] Figs. 66B(i) and 66B(ii)

figures for the past with which present figures might be compared as the physical boundaries of the basin do not readily correspond with those of parish units. However, the following would seem to provide grounds for optimism.

(1) The population of Rannoch at the time of the 1951 census was 1000, or 898, exclusive of hydro and forestry. In the nine intervening years (1951 - 60), the non hydro and forest population is estimated to have declined by 75 persons, that is, to 823. During the same period, men engaged temporarily on hydro-electric construction work at Gaur were replaced by a permanent hydro[a] and forest population of 156.[b] There would appear to have been a net gain of 81 persons (+ 156 - 75 = + 81) as a direct consequence of hydro-electric and forestry developments. Men temporarily engaged on work on the Loch Ericht Power Station have been excluded from this reckoning.

(2) The population of Pitlochry increased by 429 (20.7%) between 1931 (2072) and 1961 (2501). The 1951 population (2383) would appear to have included men temporarily engaged on construction work on the local dam site. While it is impracticable to assess accurately how much this increase is due to the developments carried through by the Board except in terms of the 97[c] hydro employees and dependents now resident, there is evidence that both trade and tourism have been stimulated which in turn has attracted people to reside in the burgh.

(3) Although the agricultural population declined (this is a nation-wide trend consequent on many reasons), the total resident population in Blair Atholl parish is estimated to have remained fairly constant over the period 1951 - 60, thanks primarily to an influx of hydro and forest families. Further, the establishment of the forestry repair depot provided skilled employment for men who otherwise would have been forced to leave the district. The recent decision (1962) to move the workshop to Lanarkshire has created an air of despondency in the village. This cannot but

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[a] A small permanent hydro population was already resident in 1951, as, for example, at Killiechonan.

[b] Fig. 66A(i)

[c] Fig. 63A

result in the migration of many families away from the district and shows a lack of foresight on the part of the Commission which need not have happened had the Commission been under statutory obligation to promote the social well-being of the Highlands (as are the Hydro-Board) in addition to the planting of trees.

Yet despite the loss of the repair deopt, one cannot but conclude that the promotion of hydro-electric and forestry schemes, has made a significant contribution in terms of population to the Tummel Basin. The numbers involved may be small by urban standards but measured by Highland values, they are symbolical of the new hope which these industries have brought to the mountainous north of Britain. The writer is of the opinion that when the 1961 census figures are published, they will compare favourably - if allowance is made for men temporarily engaged on a construction work - with previous census returns. While the agricultural population has declined, hill farming is today more prosperous than ever before. It was imperative that much of the "surplus" population had to go in the face of increasing mechanisation and costs and the overall improvement in the agricultural economy. What is of particular interest and value is that the population is probably more diversified than at any former period. New people with new ideas and from differing backgrounds have been brought into the area. Undoubtedly, many have come and gone having found life in a Highland environment unsuited to their temperament but those who remain are a valuable addition to existing society in Northern Perthshire. The facts revealed in the text and tables of this chapter provide the economist and sociologist with much food for thought. Their implications are far reaching and of considerable importance for the future social and economic development of the region. In the following pages the writer wishes to analyse the new populations further and to consider their present and possible future contribution to society.

The New Populations - Their Contribution to Society

We have already noted that hydro-electricity and forestry supported about 600 people in the basin in 1960 and that many of these were incomers. At time of census, a note was made of their origin. Most appear to have come from one of the following

regions of Britain.

(1) Other districts of the Highlands.

(2) North-East Scotland, primarily Aberdeen city and county.

(3) The Scottish Lowlands, notably Angus, Dundee, Fife, Stirlingshire, Ayrshire, Glasgow and Clydeside.

(4) South-East England.

The last named is a significant reversal of the normal migration trend, a fair proportion of Board employees originating from this region. Most employees in private woodlands are locals but most state forest labour is recruited from outside, though almost entirely from other parts of Scotland. At Kinloch Rannoch, for instance those resident in the Commission's small housing scheme originated as follows:- locals - 4; Aberdeen city and county - 3; Pitlochry - 1; Glen Lyon - 1; Argyll - 1; Glasgow - 1.

Turnover among those employed in hydro-electricity is insignificant. Most have been in the area for several years, indeed some families were employed by the Grampian Company. This contrasts with a fairly large turnover among Commission employees (forest workers), in general, the rate of change increasing from east to west across the region. In Glen Errochty and in parts of Rannoch, great difficulty is experienced not only in recruiting but also in retaining labour. The empty houses at Trinafour bear evidence of this. Private forest labour, probably on account of local recruitment, is much more static.

Most newcomers are young couples with families, many coming from regions of close settlement. Nearly all considered Pitlochry an ideal centre in which to live, the town itself being a fair-sized community with the necessary shops and "bustle" and within easy reach of the larger centres of Perth and Dundee for entertainment and other facilities. But the contrast between town life and the solitudes of say, Rannoch or Glen Errochty, is often too great for many incomers to bear. And who suffer most? The answer lies not with the menfolk or the children, but with the wives. As one local inhabitant of Kinloch Rannoch commented, "The men are happy but the wives cannot get over the lack of shops. Women just don't settle down very well."

In Glen Errochty life is even more remote. There are neither shops nor a bus service and the normal way of travel is by forestry car to Calvine (1/6d. return) and then a further ten miles by train to Pitlochry. In the Tummel Valley the bus service between Kinloch Rannoch and Pitlochry (19 miles) is poor, there being only 2 - 3 buses per day, while west of Kinloch Rannoch there is no service at all, except the mail bus. Considering that many employees, particularly forest employees, have no car, it is hardly surprising that wives consider themselves living in the "back of beyond".

Without doubt, remoteness is a factor tending to unsettle newcomers to the region and for which there seems no solution considering the scattered nature of the population, which is such as to make the provision of public transport services quite economic. Yet it is interesting to record that remoteness is much less of an issue among hydro than forest families. Of course, this is partially accounted for by the fact that the bulk of the hydro families are housed in less remote locations than Commission employees but might it not also be related to the difference in origin and type of people normally recruited by the two authorities? Work with the Commission in the category of a forest worker is one of the relatively few jobs available to all, if physically fit, where a house is provided with the employment, but the relatively low basic wages paid do not act as an incentive to the recruitment of the better type of worker who would prove an asset to the Commission. Instead, unskilled men often with a high unemployment record, tend to be attracted, many of whom after a short period in forestry not only are quite unsuited to the work but are sadly disillusioned. Further, they and their wives have generally little in common with the local inhabitants. They find it difficult to make friends, suffer loneliness and consequently, make their way back to the town either directly, or, by way of employment elsewhere with the Commission, a little nearer "civilisation". By contrast, labour recruited by the Hydro Board is normally skilled, that is, men already trained in the basic techniques of the work they will be required to carry out in the Board's employment. Further, such men are of a higher educational standard than the normal type of forest worker recruited, and wages usually considerably in excess than the latter can normally hope to obtain. Thus better equipped to meet the challenge of life in

a Highland environment, hydro employees and families settle down and make friends more easily than their forest counterparts. Not all, of course, do find such life to their liking, but it was reassuring to find that in remote locations like Trinafour. Killiechonan and Bridge of Ericht, despite the lack of a bus service (there was a mail bus service until late 1962 but even this is now discontinued) and poor T.V. reception, the resident hydro families were generally content to continue living there.

While remoteness is a relevant factor, the retention of labour seems to hinge also on (a) the type of employee and family attracted, and (b) wages. Both are largely interdependent and in both the Commission is relatively worse off, and hence, their labour turnover is higher than that experienced by the Board. Yet the situtation in Allean Forest provides food for thought. Although less isolated than say Rannoch - the houses are by the main road and most are only about 7 miles from Pitlochry - it was learned that the men would not have stayed had not a high proportion of the work been done at piece rates. In addition, much money is earned during leisure hours making birch besoms. Bundles of twigs are gathered, normally 17 per bundle - this is the amount which may be comfortably grasped by a normal sized hand - which are in great demand by the steel mills of Lanarkshire for the hardening of steel. Each besom fetches 1d. and with the whole family helping, as much as £2 or £3 may be earned in a day.

What of the wives? Most find employment during the summer in the tourist industry either in the immediate area or in Pitlochry.

Consequently, Allean Forest has experienced little turnover in labour in recent years although nearly all are incomers to the area. Undoubtedly, much of the contentment stems from the fact that there is money available. Now all the conditions pertaining to Allean cannot perhaps be provided in other localities but if forest workers were paid a higher basic wage, then the problem of finance would be greatly eased and would serve not only as a means of retaining labour already in the Commission's service, but would stimulate recruitment of a better class of employee and so lead to greater stability among forest populations. The Commission must be encouraged to break away from a policy pegged to agricultural wage levels. Until

wage levels increase it is the writer's firm conviction that the Commission will continue to be faced with the problem of recruiting and retaining the necessary labour it so urgently requires in carrying through its vast afforestation programme. Positive action is required now for the Commission can ill afford to be constantly training new workers without receiving anything like full benefit in return from their skills. Neither can a high turnover of labour be conducive to successful forestry.

On the whole the area is well served educationally in spite of the fact that by virtue of the scattered nature of the population, children, particulary those attending secondary schools, may be forced to travel long distances either by bus, train or taxi.

The influx of a younger element into the population is reflected in the school roll which increased by 57.8% over the period 1944 - 60.[a] The increase is also consequent on the steep rise in the birth rate following the late war and the tendency for pupils to continue longer in secondary school than previously. With the exception of a minor peak in session 1949/50 - the peak period of hydro-electric construction work - the trend overall is one of steady growth, yet it is notable that three schools have been closed since 1944, namely, Killiechonan (1946), Rannoch Station (1950), and Dall (1960), while, prior to 1943, there was also a school at Fincastle on the Bonskeid Estate. Glen Errochty school was also shut from 1948 - 51 due to lack of pupils. Recently (1961), the Education Authority have been considering shutting both this school and the one at Glengarry and conveying the pupils to Struan daily. There is also the suggestion that the school at Dalnaspidal may be closed and the pupils transferred to the nearby school at Dalwhinnie (Inverness-shire) under a county agreement similar to the one exercised at Arrochar - Tarbet between Argyll and Dunbartonshire. These changes have been, or are being, carried through primarily on grounds of economy in consequence of the great age of many of the small rural schools, which in turn makes necessary the spending of considerable sums on schemes of modernisation and repair, and the small numbers of children involved.[b]

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[a] Fig. 67

[b] The major reason for considering the closure of Glen Errochty was the fluctuating level of the school roll in consequence of the large turnover of forest families at

Pitlochry High School provides primary education for local children and secondary education for all children, from as far afield as Dalnaspidal in the north, Dunalastair in the west and Ballinluig in the south. Recently, the school was upgraded to provide courses for S.C.E. "O" Level, but children wishing to study for their "Highers", must attend Breadalbane Academy, Aberfeldy. Despite the fact that Pitlochry's population in 1961 was 2501 and Aberfeldy's only 1469, the County Education Committee rejected a request to provide full Senior Secondary Education at Pitlochry. It was agreed that it would be better to concentrate such facilities in one centre than to provide them in two separate schools which would entail the duplication of equipment and teaching staff. Further, Aberfeldy, because of its geographical location, was more centrally placed to meet the educational requirements of the Highland District of Perthshire. However, as a parting gesture, the County Council agreed (1961) to provide a new High School for Pitlochry. Nevertheless, there is a quiet air of local optimism that the County Council may yet rescind their decision and upgrade Pitlochry High School to full Senior Secondary status.

Secondary children from Rannoch are conveyed to Breadalbane Academy, Aberfeldy. Children are conveyed by bus on Monday morning, reside in hostels attached to the school during the week and return by bus on Friday. In consequence of the fact that population in Rannoch is increasing and that children require to hostel during the week in Aberfeldy, the writer would like to see secondary education, at least to the statutory leaving age of 15, provided in Kinloch Rannoch. To be economic the school, in addition to serving the whole of Rannoch, might also serve parts of Foss, at present served by Pitlochry High School, and neighbouring Glen Errochty.

Socially, education raises none of the problems referred to under the Beauly Basin. Children from incomer hydro and forest families seem to adapt themselves well to life in the rural schools. Their aptitude to work is as good as that existing among local children. As far as could be ascertained, the standard of education seemed as high as in city schools. It was interesting to learn that many pupils at Kinloch Rannoch School have pen pals in the Rannoch district of Australia.

By reason of its physical setting, consequent remoteness from large centres of

population, lack of through road and general isolation, the Tummel Valley has for long suffered social isolation and stagnation. In the past 15 years, in particular, much has changed. Together with hydro-electric and forestry development, tourism has expanded, hill farming has prospered and the general isolation has been considerably lessened thanks to the mobility provided by the motor car, radio and television, and the influx of new people. In this study we are primarily concerned with the last named and to assessing their contribution to local community life and spirit.

Generally, by virtue of reasons already stated, the incomer forest populations have made much less impact than might have been expected. In Kinloch Rannoch, for instance, despite the fact that they constitute about one-fifth of the population, forest families tend to keep themselves to themselves and consequently, their influence on the local community is small. It is suggested that this may also be due to the grouping of nearly the whole of the forest population into what is literally a separate community located apart from the rest of the village. Socially, the Commission built houses are badly sited for their location tends to hinder rather than promote relations with the local community and contributes to the difficulties already raised and referred to through the recruitment of the "wrong type" of forest worker. At present the only apparent positive contributions made by the forest community to the village would seem to lie in the increase in the school roll which has also led to an increase in school staff and the extra trade to local shops and transport services.

In Glen Errochty the Commission made a brave attempt to resuscitate life by extablishing a small forest community at Trinafour. Unfortunately, the effort has proved rather a failure and in consequence of the large turnover of workers, the effect socially has been nil. While the expanding programme of afforestation in Glen Errochty will make necessary the recruitment of additional labour, it would be a mistake to house them at Trinafour. Theoretically, it is sound forest policy to have one's workers housed on sites most convenient for afforestation, but in practice, the Commission is being unduly optimistic in believing that houses can be located in remote areas and people - many of whom are town born and bred - expected to live in them. Community life in Glen Errochty was dead even before the forest houses were constructed and the few locals who remained were then travelling and have since elected

to continue travelling to Blair Atholl, Pitlochry or beyond, for recreation and amusement. The obvious location for new housing is in centres where there is already evidence of an active community life. For Glen Errochty, Blair Atholl would be an ideal centre where the addition of further forest families might help strengthen the existing community life of the village. Tummel Bridge and Kinloch Rannoch, though smaller, might also be considered; the former already a fair-sized community owing its present development, to its position at a cross-roads, and its consequent choice as the major centre for the Board's operations in the area, 165, 166, 167 and the latter as the natural capital and focus of Rannoch. By virtue of their different origin, temperament ideas and outlook, the new forest and hydro populations may provide the initiative and leadership necessary for the resustication of local community life. There is already evidence of this in a number of locations, notably Tummel Bridge, but success will obviously depend on the temperament and character of the individual newcomer and how well he can adapt himself to the local environment particulary in his relations with local people.

Pitlochry is richly endowed with voluntary, youth, and women's organisations,[a] together with miscellaneous societies and clubs[b] catering for a variety of aesthetic and recreational needs. Because of its size it is not easy to assess what contribution the new forest and hydro populations both resident within and outwith the burgh have made to the development, continuance and success of such activities, but it may be inferred that in proportion to their size, particularly the hydro communities at Lettoch and Parkcroy, they play a significant part.

While Pitlochry and to a lesser extent Aberfeldy serve as centres to which people resident in the basin tend to gravitate in search of recreation and entertainment, they themselves in turn lose a proportion of their population - particularly the younger element - to Perth or even Dundee, where a wider choice of such facilities, notably

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[a] Organisations include local troops of Boy Scouts and Girl Guides, local church Youth Fellowships, an Army Cadet Unit, a lodge of the Eastern Star and two branches of the Women's Rural Institute.

[b] Societies include an Operatic Society, cricket, football, tennis, golf, hockey, curlin badminton, gymnastic, angling, carpet bowls and bridge clubs, an amateur dramatic group, a Burn's Club, a Rotary Club, a Pipers' Association and a Development Association.

modern ballroom-dancing, may be had. This is particularly noticeable at weekends. While many do travel by public transport, the greater mobility of the population attendant on car ownership has brought urban life and recreational pursuits within easy reach of an ever increasing proportion of the population of Highland Perthshire.[a] Such a phenomenon is, of course, not one peculiar to this area but is rather a distinctive feature of society in mid-20th Century Britain.

While the breakdown of the former isolation and the influx of new people have helped revivify society in Northern Perthshire, one cannot but express regret that much of what was best in the old traditional way of life is fast disappearing and the Gaelic tongue is now much less widely spoken than it was even twenty years ago. It is estimated that while an estimated 40% of the adults of Rannoch - a fair proportion of whom are incomers from the West Highlands - still have the Gaelic, few children speak it. Why should this be? Four reasons seem mainly responsible for the decline of the old language as a spoken tongue.

(1) The grand-parents of the present generation grew up in a community where Gaelic was always spoken but English was nevertheless understood. The next generation learned to speak both equally well but their children (the present generation) in turn, although understanding Gaelic, nearly always converse in English. Consequently, the next generation will be able to neither understand nor to speak Gaelic and unless, somehow, drastic action is taken, it is inevitable that the only Gaelic in Rannoch will be found in place names many of which have already been partially anglicised.

(2) The influx of incomers with no Gaelic together with the decline in the number of local people as has occurred for nearly two centuries, have led to the displacement of the old tongue in favour of English.

(3) English is the medium used in television and radio, both of which now reach to the remotest corners of the region and so have removed the remaining vestiges of its

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[a] The following mileages may be noted. All are approximate.

Pitlochry to Perth - 29	Pitlochry to Dundee - 44
Aberfeldy to Perth - 35	Aberfeldy to Dundee - 50

All mileages feature the Great North Road (A9) over at least part of the distance.

former isolation. By contrast, the Gaelic language has not been adapted quickly enough to meet modern needs. Why, for instance, is more effort not devoted to the translation of modern songs and items of current interest into Gaelic, as say is done with French, German, etc? The writer is aware of the economic considerations involved but if the language is to survive, then finance must somehow be provided to allow such to be carried through even, perhaps initially, on a small scale. For too long has the language basked in the declining twilight of 19th Century romanticism which so many people, including Scots, still link with things Highland.

(4) Locally, there is apathy among parents towards the future of the language. Few seem to care if their children ever learn to speak the language fluently in the face of steady encroachment by English in everyday usage. The occasional ceilidh and the annual provincial Mod at Aberfeldy may awaken temporary enthusiasm but this is all too readily lost in day to day life.

Progress or regress, call it what you may, Gaelic seems destined to disappear as a spoken tongue from the confines of the basin.

Another effect directly related to the influx of new people and which is both social and economic, has been the creation of a steady demand for merchandise which formerly was not normally stocked in the region because of lack of demand. The insistence of newcomers, particularly those from south of the Border for this, that and the next thing, has made available to the local inhabitants goods of a wider range and taste than were formerly procurable.

Overall, one cannot but conclude that the presence of the new hydro and forest populations has been of benefit to both local society and community life. For reasons referred to in the text the effects may have been less than expected and on this account the Commission, in particular, would do well to reconsider the social implications arising from badly sited houses and the low basic wages of forest workers. On the other hand, it would be unfair not to make mention that state forestry is a relatively new industry in the region and that present difficulties and labour instability may in part be due to the initial "teething" problems which nearly always accompany the establishment of new industry and new populations in any area. Nevertheless, it is worthy to note that the Hydro Board have been relatively

free of such recurrent problems although basically they were initially faced with similar difficulties.

FIG. 62 TUMMEL BASIN - NUMBER OF MEN EMPLOYED ON HYDRO-ELECTRIC CONSTRUCTION WORK, 1950 - 1961

Scheme	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Pitlochry Clunie Errochty	1301	669	647	1160	1179	1016	619	640	270	74	45	-
Gaur	-	48	169	227	108	-	-	-	-	-	-	-
Cuaich Ericht	-	-	-	-	-	-	-	-	487	189	50	75
Total	1301	717	816	1387	1287	1016	619	640	757	263	95	75
All Hydro Schemes	7770	4450	4854	6227	7362	8570	6595	5713	4818	2385	2161	2270

The Census figures refer to the month of May, except for the year 1961, when the figures refer to the number employed as at 15th April. The figures include labour force, administrative, clerical and camp staff. No figures are now available for years previous to 1950.

FIG 63A TUMMEL BASIN - CENSUS OF HYDRO BOARD EMPLOYEES AND DEPENDENTS, AUGUST 1960

Place	No. of Houses	Adults	Children[g]	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s[h]	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Pitlochry Lettoch	21	50	19	69	7	12	1	29	18	2
Parkcroy	8[a]	15	4	19	2	2	-	8	6	1
Ferry Road	4[b]	6	3	9	3	-	-	6	-	-
	33	71	26	97	12	14	1	43	24	3
Tummel Bridge	9[c]	19	12	31	4	8	-	13	6	-
	10[d]	21	12	33	7	5	-	13	7	1
Camp	-	30	-	30	-	-	-	18	12	-
	19	70	24	94	11	13	-	44	25	1
Tummel Valley										
Foss	2[e]	4	1	5	-	1	-	4	-	-
Clunie Dam	1	3	3	6	-	3	1	2	-	-
Kinloch Rannoch	1[e]	2	-	2	-	-	-	-	2	-
Killiechonan	1[e]	3	2	5	-	2	-	1	1	1
	6[c]	11	3	14	1	2	1	4	6	-
Bridge of Ericht	2	4	3	7	2	1	-	1	3	-
	1[e]	3	-	3	-	-	-	-	2	1
Finart	1[e]	2	2	4	-	2	-	1	1	-
Gaur	1	2	3	5	1	2	-	2	-	-
	16	34	17	51	4	13	2	15	15	2
Glen Errochty										
Trinafour	1	2	1	3	1	-	-	2	-	-
	1	2	1	3	1	-	-	2	-	-
Tummel Basin	69[f]	177	68	245	28	40	3	104	64	6

[a] One house let to non-hydro employee, population therefore excluded from census.

[b] Temporary houses (wooden), one empty.

[c] Erected by Grampian Company.

[d] Adjacent to camp site (mainly wooden). 4 out of 10 houses built by Board. Also included is the home of Mr D.F. Milne (generation engineer of the Tummel Valley Group of stations). This house is on south bank of the Tummel about 200 yards west of the Grampian houses.

[e] Non-hydro built houses.

[f] Houses: Grampian built 15
Board built 45 (32 stone, 13 wooden). A stone house is to be built at Dalwhinnie.
Others 9

[g] Sex of children:

Pitlochry	-	15 boys	and	11 girls
Tummel Bridge	-	12 boys	and	12 girls
Foss	-	1 boy		-
Clunie Dam	-	-		3 girls
Kinloch Rannoch	-	-		-
Killiechonan	-	1 boy	and	1 girl
Bridge of Ericht	-	5 boys	and	1 girl
Finart	-	-		2 girls
Gaur	-	1 boy	and	2 girls
Trinafour	-	1 boy		-
		36 boys	and	32 girls

[h] Refers to children still at school and young adults attending further education, e.g. University, but because of age, are included here as adults.

FIG 63B TUMMEL BASIN - CENSUS OF HYDRO BOARD EMPLOYEES AND DEPENDENTS, AUGUST 1960, WITH SELECTED AGE GROUPINGS, EACH EXPRESSED AS A PERCENTAGE OF THE TOTAL POPULATION

Place	Adults	Children	Adults, 15-44 age group[a]	
			Percentage of total population	Percentage of adult population
Pitlochry	73.2	26.8	45.4	62.0
Tummel Bridge	74.5	25.5	46.8	62.9
Tummel Basin	72.2	27.8	42.5	58.8

[a] Includes those in category 15S in Fig. 63A. This age grouping (15.44) is significant as it normally includes all women of childbearing age.

FIG. 64A TUMMEL BASIN - CENSUS OF FORESTRY COMMISSION EMPLOYEES AND DEPENDENTS, AUGUST 1960

Place		No. of Houses	Adults	Children#	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s+	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Allean	F.W.	5[a]	11	12	23	2	10	-	4	7	-
	F.	1[b]	3	-	3	-	-	1	1	1	-
	F.W.H.	2[c]	4	2	6	-	2	-	2	2	-
		8	18	14	32	2	12	1	7	10	-
Faskally Instructional Staff		4[d]	10	5	15	5	-	2	6	2	-
Domestic Staff		-[e]	5	-	5	-	-	-	4	1	-
Students		-[e]	23	-	23	-	-	23	-	-	-
	F.W.	1[f]	2	3	5	3	-	-	2	-	-
	Others	3[g]	6	8	14	3	5	-	6	-	-
		8	46	16	62	11	5	25	18	3	-
Glen Errochty											
	F.W.	6[h]	8	7	15	1	6	-	7	1	-
	F.	1[j]	2	4	6	1	3	-	2	-	-
	F.W.H.	1[k]	3	-	3	-	-	1	1	1	-
		8	13	11	24	2	9	1	10	2	-
Rannoch	F.W.	18[m]	31	17	48	9	8	-	21	10	-
	F.	2[n]	4	6	10	2	4	-	4	-	-
	F.W.H.	4[p]	13	5	18	2	3	-	9	4	-
	Hostel	1[q]	10	-	10	-	-	-	8	2	-
	Others	2[r]	8	6	14	1	5	-	6	2	-
		26	66	34	100	14	20	-	48	18	-
Directorate Workshop (Blair Atholl)											
	Staff	15[s]	29	14	43	3	11	-	25	4	-
	Hostel	1[t]	3	-	3	-	-	-	2	1	-
	Others	-[u]	3	-	3	-	-	-	3	-	-
		16	35	14	49	3	11	-	30	5	-

FIG. 64A (Continued)

Place	No. of Houses	Adults	Children*	Total	Age Groupings: Children 0 - 4	Children 5 - 14	15s+	Adults 15 - 44	Adults 45 - 64	65 and over
Tummel Basin (excluding workshop) F.W.	30	52	39	91	15	24	-	34	18	-
F.	4	9	10	19	3	7	1	7	1	-
F.W.H.	7	20	7	27	2	5	1	12	7	-
Hostel	1	10	-	10	-	-	-	8	2	-
Faskally Staff and Students	4[V]	38	5	43	5	-	25	10	3	-
Others	5	14	14	28	4	10	-	12	2	-
	50	143	75	218	29	46	27	83	33	-
Tummel Basin (including workshop) Houses	65	178	89	267	32	57	27	113	38	-
Hostels	2									
Training School	1									
Village Groupings										
Kinloch Rannoch F.W.	15	27	17	44	9	8	-	21	6	-
F.	2	4	6	10	2	4	-	4	-	-
Others	-	1	-	1	-	-	-	1	-	-
	17	32	23	55	11	12	-	26	6	-
Trinafour F.W.	5	7	7	14	1	6	-	7	-	-
F.	1	2	4	6	1	3	-	2	-	-
	6	9	11	20	2	9	-	9	-	-

Key to houses: F.W. - Forest Workers
F. - Foresters
F.W.H. - Forest Workers' Holdings

C.B. - Commission built house
N.C.B. - Non-Commission built house

* Sex of Children:

Allean	8 boys and 6 girls;	Rannoch	14 boys and 20 girls;	Directorate Workshop	9 boys and 5 girls
Faskally	8 boys and 8 girls;	Kinloch Rannoch	9 boys and 14 girls;	Tummel Basin (excluding workshop)	36 boys and 39 girls
Glen Errochty	6 boys and 5 girls;	Trinafour	6 boys and 5 girls;	Tummel Basin (including workshop)	45 boys and 44 girls

+ Refers to children still at school and young adults attending further education, e.g. University, but because of age are included here as adults.

Further information as to Groupings.

Allean Forest:
a 3 houses (CB), 2 houses (NCB) - Bohally Cottage, Bonskeid East Lodge.
b Forest Lodge (NCB).
c One opposite Strathtummel Youth Hostel, the other at Drumnagowan, Glen Fincastle.

Faskally Forest:
d 1 flat in Faskally House. Others in grounds - Mid Lodge, Faskally Gardens, The Kennels. All NCB.
e Resident in Faskally House.
f Lineside Cottage (NCB). Man employed in Fonab Forest.
g Includes: One man employed as a driver - West Lodge (NCB)
One man employed as a gardener - East Lodge (NCB)
One man employed as a welder (Directorate Workshop) - Faskally Cottages (NCB).

Glen Errochty Forest:
h 5 at Trinafour (CB) - two empty - and 1 (NCB) at Struan.
j At Trinafour (CB).
k Bochonie, Glen Errochty, 4 miles east of Trinafour.

Rannoch Forest:
m 11 (CB) - 1 empty - by lochside on outskirts of Kinloch Rannoch village. Also 4 (NCB) in village, 2 (NCB) at Carie and 1 (NCB) - empty - at Bridge of Gaur.
n 2 (CB) in Kinloch Rannoch beside forest workers' houses by lochside, as above.
p 2 at Carie, 2 at Dall.
q At Bridge of Gaur (CB). Accommodates 10 men.
r Only houses of 2 trappers (NCB) at Dall Bridge Gardens and Carie included in table. Popula-:tion listed includes 3 mobile engineers (single men) in lodgings at west end of Loch Rannoch and one clerkess - employed in forestry office at Kinloch Rannoch and resident in the village.

Directorate Workshop
s Houses (NCB) mainly in Blair Atholl village. 12 married and 3 single men.
t Accommodates 10. 3 single men resident at present (1960) but temporarily accommodates drivers, etc. while machines are being overhauled.
u 2 clerkesses and 1 cook. Houses not included in table.

Tummel Basin
v Instructional staff houses only.

FIG. 64B TUMMEL BASIN - CENSUS OF FORESTRY COMMISSION EMPLOYEES AND DEPENDENTS, AUGUST 1960, WITH SELECTED AGE GROUPINGS, EACH EXPRESSED AS A PERCENTAGE OF THE TOTAL POPULATION

Place	Adults	Children	Adults, 15-44 age group[a]	
			Percentage of total population	Percentage of adult population
Allean	56.2	43.8	25.0	44.4
Kinloch Rannoch	58.2	41.8	47.3	81.2
Directorate Workshop	71.4	28.6	61.2	85.7
Tummel Basin (excluding workshop)	65.5	34.5	50.5	76.9
Tummel Basin (including workshop)	66.6	33.3	52.4	78.6

[a] Includes those in category 15s in Fig. 64A. This age grouping (15-44) is significant as it normally includes all women of childbearing age.

FIG. 65A TUMMEL BASIN - CENSUS OF PRIVATE FOREST EMPLOYEES AND DEPENDENTS, AUGUST 1960

No. of Estates	No. of Houses	Age Groupings: Children 0-14	Age Groupings: Adults 15 and over	Total
5[a]	32[b]	30	60[c]	90

[a]These represent five of the largest estates with private woodland in the Tummel Basin. Together they represent approximately 95% of the dedicated woodland in the basin.

[b]Includes 3 houses occupied by men engaged part-time in forestry.

[c]Includes 2 young adults still attending school.

FIG. 65B BONSKEID ESTATE - CENSUS OF FOREST EMPLOYEES AND DEPENDENTS, AUGUST 1960

Name of Estate	No. of Houses	Age Groupings: Children 0-14	Age Groupings: Adults 15 and over	Total
Bonskeid[a]	6[b]	4	12[c]	16

[a]This information was provided by courtesy of R.S. Barbour, Esq.

[b]5 of these houses are estate cottages and 1 is an "agricultural" council house in Killiecrankie.

[c]Includes 6 employees. These men are employed in all types of estate work of which two-thirds could be classed as forestry work, therefore, they are classed here as full-time forest employees.

FIG. 66A(i) TUMMEL BASIN - CENSUS OF POPULATION OF THE RANNOCH DISTRICT, FOSS DISTRICT AND TUMMEL VALLEY, AUGUST, 1960, (1) EXCLUSIVE OF HYDRO AND FOREST POPULATIONS, (2) HYDRO AND FOREST POPULATIONS, AND (3) INCLUSIVE OF HYDRO AND FOREST POPULATIONS

Area		Adults	Children[d]	Total
Rannoch District[a]	(1) exclusive of hydro and forest populations	698	125	823
	(2) hydro and forest populations	101	55	156[e]
	(3) inclusive of hydro and forest populations	799	180	979
Foss District[b]	(1) exclusive of hydro and forest populations	139	57	196
	(2) hydro and forest populations	106	46	152[e]
	(3) inclusive of hydro and forest populations	245	103	348
Tummel Valley[c]	(1) exclusive of hydro and forest populations	837	182	1019
	(2) hydro and forest populations	207	101	308[e]
	(3) inclusive of hydro and forest populations	1044	283	1327

[a] Rannoch District refers to that part of the Tummel Valley lying to the west of Dalno, Tummel Bridge, as far as Rannoch Station.

[b] Foss District refers to that part of the Tummel Valley lying between Dalno and Bridge of Garry. Glen Fincastle is included.

[c] Tummel Valley refers to the two districts combined.

[d] As in the other tables, children refer to persons of 0-14 years of age.

[e] The hydro and forest populations constitute 15.9%, 43.7% and 23.2% of the total populations in Rannoch, Foss and Tummel Valley respectively.

The statistics for the non hydro and forest populations were compiled with the help of the registration officers of each district, and to whom the writer is greatly indebted. The hydro and forest statistics include figures for private forestry in so far as these were known.

FIG. 66A(ii) TUMMEL BASIN - CENSUS OF POPULATION OF TUMMEL BRIDGE AND KINLOCH RANNOCH, AUGUST, 1960, (1) EXCLUSIVE OF HYDRO AND FOREST POPULATIONS, (2) HYDRO AND FOREST POPULATIONS, AND (3) INCLUSIVE OF HYDRO AND FOREST POPULATIONS.

Place		Adults	Children	Total
Tummel Bridge	(1) exclusive of hydro and forest populations	11	12	23
	(2) hydro and forest populations	70[a]	24	94[bd]
	(3) inclusive of hydro and forest populations	81	36	117
Kinloch Rannoch	(1) exclusive of hydro and forest populations	-	-	212
	(2) hydro and forest populations	34	24	58[cd]
	(3) inclusive of hydro and forest populations	-	-	270

[a]Includes population of semi-permanent hydro camp.

[b]Tummel Bridge: hydro - 94, forest - 0.

[c]Kinloch Rannoch: hydro - 3, forest - 55.

[d]The hydro and forest populations constitute 80.3% (54.7% excluding camp) and 21.5% of the total populations in Tummel Bridge and Kinloch Rannoch respectively.

FIG. 66B(i) TUMMEL BASIN - CENSUS OF THE POPULATION OF THE RANNOCH DISTRICT, FOSS DISTRICT AND TUMMEL VALLEY, AUGUST, 1960, (1) EXCLUSIVE OF HYDRO AND FOREST POPULATION, (2) HYDRO AND FOREST POPULATIONS, AND (3) INCLUSIVE OF HYDRO AND FOREST POPULATIONS, WITH EACH AGE GROUPING EXPRESSED AS A PERCENTAGE OF THE TOTAL POPULATION.

Area		Adults	Children
Rannoch District	(1) exclusive of hydro and forest populations	84.8	15.2
	(2) hydro and forest populations	64.8	35.2
	(3) inclusive of hydro and forest populations	79.6	20.4
Foss District	(1) exclusive of hydro and forest populations	70.9	29.1
	(2) hydro and forest populations	69.7	30.3
	(3) inclusive of hydro and forest populations	70.4	29.6
Tummel Valley	(1) exclusive of hydro and forest populations	82.1	17.9
	(2) hydro and forest populations	67.2	32.8
	(3) inclusive of hydro and forest populations	78.9	21.3
	The figures below for Scotland[a] are shown for comparison		
Scotland		75.4	24.6

[a] Percentages compiled from 1951 census. At time of writing, 1961 census figures were not yet available.

FIG. 66B(ii) TUMMEL BASIN - CENSUS OF POPULATION OF TUMMEL BRIDGE AND KINLOCH RANNOCH, AUGUST, 1960, (1) EXCLUSIVE OF HYDRO AND FOREST POPULATIONS (2) HYDRO AND FOREST POPULATIONS, AND (3) INCLUSIVE OF HYDRO AND FOREST POPULATIONS, WITH EACH AGE GROUPING EXPRESSED AS A PERCENTAGE OF THE TOTAL POPULATION.

Place		Adults	Children
Tummel Bridge	(1) exclusive of hydro and forest populations	47.8	52.2
	(2) hydro and forest populations	74.5[a]	25.5
	(3) inclusive of hydro and forest populations	69.2	30.8
Kinloch Rannoch	(1) exclusive of hydro and forest populations	-	-
	(2) hydro and forest populations	58.6	41.4
	(3) inclusive of hydro and forest populations	-	-

[a] The extraordinarily high proportion of adults is due to the present of the semi-permanent hydro camp. If the camp is excluded then the percentages of adults and children are 42.6 and 57.4 respectively, both figures approximating to those for the remainder of the village.

FIG. 67 TUMMEL BASIN - SCHOOL ROLL, 1944 - 1960

	1944 /45	1945 /46	1946 /47	1947 /48	1948 /49	1949 /50	1950 /51	1951 /52	1952 /53	1953 /54	1954 /55	1955 /56	1956 /57	1957 /58	1958 /59	1959 /60
Blair Atholl	66	58	64	71	80	74	72	74	80	93	98	84	85	89	98	100
Dall	7	11	7	5	5	6	8	10	15	11	8	9	13	18	14	16
Dalnaspidal	10	13	11	13	12	9	7	6	7	8	9	9	9	8	6	3
Foss	8	8	8	8	7	6	5	12	12	14	13	11	14	14	14	15
Georgetown	9	7	6	5	7	5	10	10	10	12	13	14	14	9	6	9
Glen Errochty	4	4	2	7	-	-	-	7	8	9	16	16	11	12	10	13
Glen Garry	10	10	10	7	6	7	9	10	11	9	9	11	11	12	16	14
Killiechonan	4	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Killiecrankie	12	14	17	14	12	13	11	14	22	28	22	20	14	16	16	21
Kinloch Rannoch	53	46	44	48	45	53	47	47	47	52	54	56	61	59	62	69
Pitlochry High (Primary)	205	200	209	207	217	227	228	216	240	265	267	277	290	307	310	289
(Secondary)	78	84	97	134	154	160	134	122	137	143	145	149	148	145	166	191
Rannoch Station	5	6	6	6	6	5	-	-	-	-	-	-	-	-	-	-
Strathtummel	11	15	17	16	11	13	19	21	23	24	26	27	25	21	24	18
Struan	11	11	11	12	11	16	22	26	25	23	24	24	27	25	23	20
	493	493	509	553	573	594	552	575	637	691	704	707	722	733	765	778
Breadalbane Academy (Primary)	190	193	183	175	176	187	183	202	229	219	222	223	220	209	202	188
(Secondary)	167	189	204	228	232	221	211	224	242	240	237	238	252	240	251	280

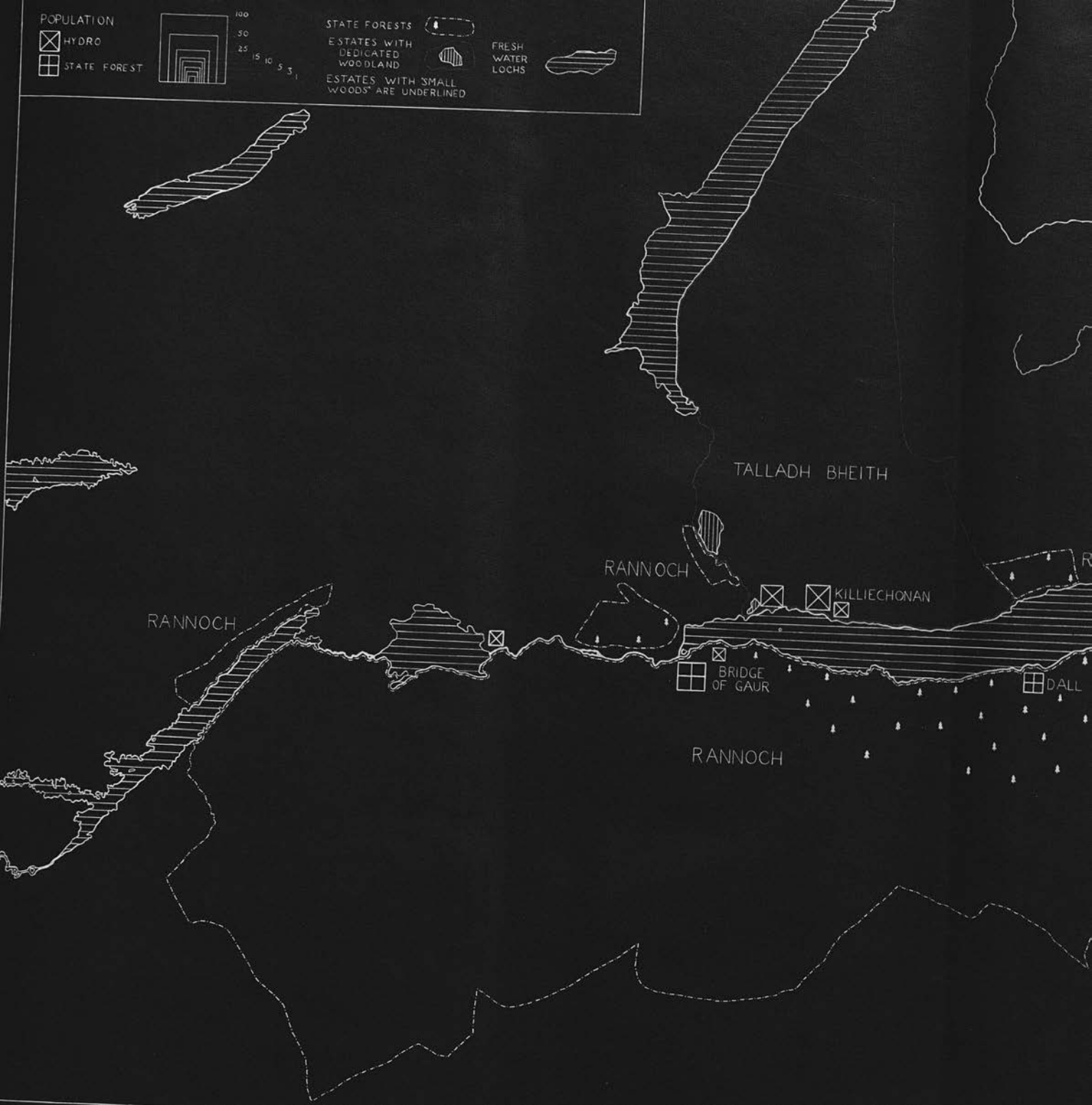
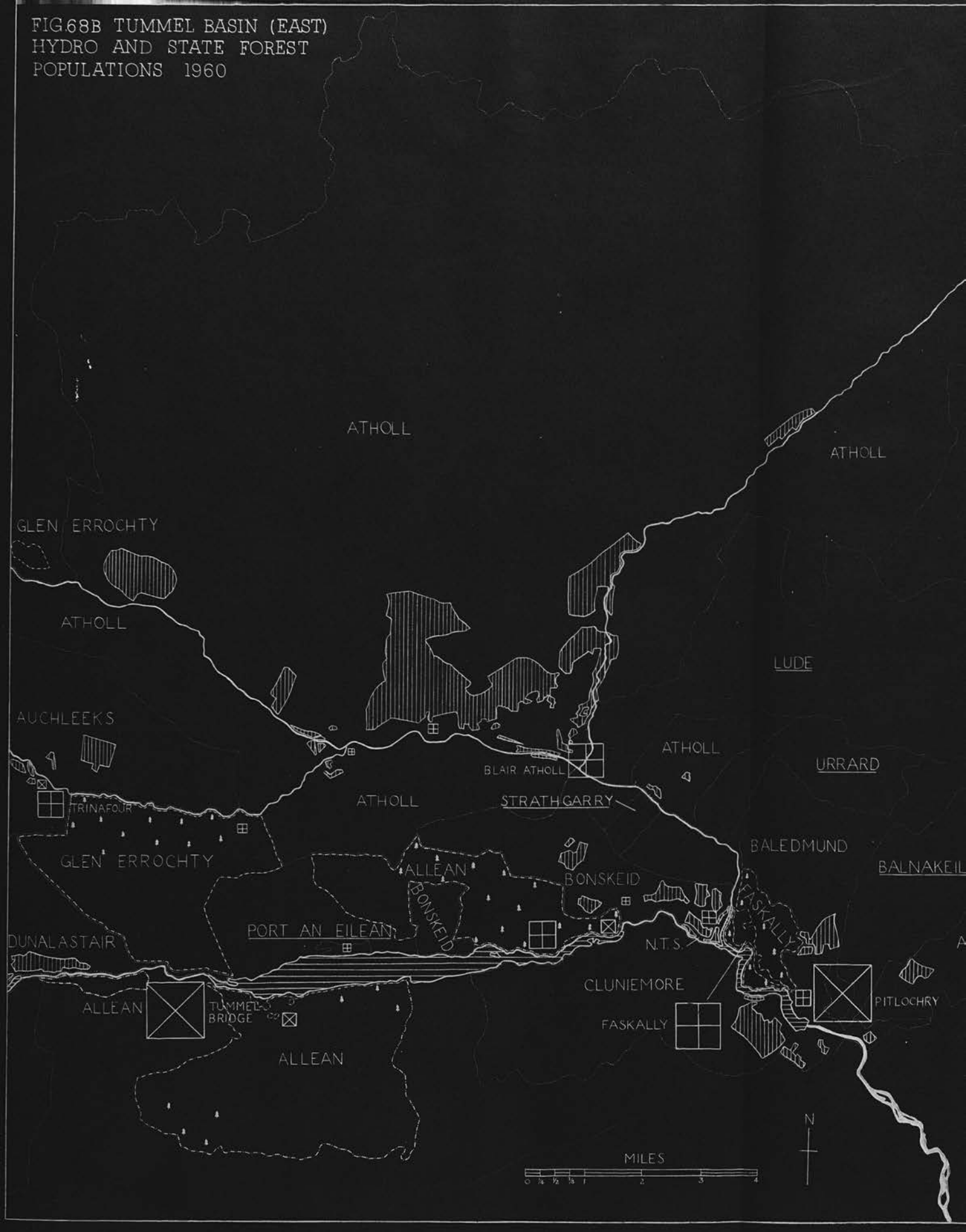

POPULATION
HYDRO
STATE FOREST
100
50
25
15
10
5
3
1
STATE FORESTS
ESTATES WITH DEDICATED WOODLAND
ESTATES WITH 'SMALL WOODS' ARE UNDERLINED
FRESH WATER LOCHS
TALLADH BHEITH
RANNOCH
KILLIECHONAN
RANNOCH
BRIDGE OF GAUR
DALL
RANNOCH

FIG.68B TUMMEL BASIN (EAST)
HYDRO AND STATE FOREST
POPULATIONS 1960



PHOTOGRAPHS

159. Hydro Houses, Killiechonan (Erected by Grampian Company).

160. Hydro Houses, Tummel Bridge (Erected by Grampian Company).

161-162. Lettoch Crescent Hydro Housing Scheme, Pitlochry.

163. Hydro House, Trinafour. This house has underfloor heating by electricity.

164. Forest Workers' Houses, Allean.

165. Changed Landscape, (i) Tummel Bridge early in the century. (Courtesy H. Cook, Esq., Pitlochry).

166-167. Changed Landscape, (ii) Tummel Bridge to-day (1960).

Note: Phots. 165-167 bear witness to the changes which have occurred in fifty years. Of note is the spread of woodland (scrub) and bracken which necessitated taking two pictures to photograph the modern landscape. The old inn has been replaced by houses erected by the Grampian Company for hydro staff. Only the former stables remain. The picturesque old Wade bridge still stands but a modern steel bridge has been built by its side to carry modern traffic (first necessitated when construction work began on the scheme in 1930). To-day (1960), 117 persons (81 adults and 31 children) are resident in the village, of whom 94 are hydro employees and families. Most of the latter are incomers to the district.

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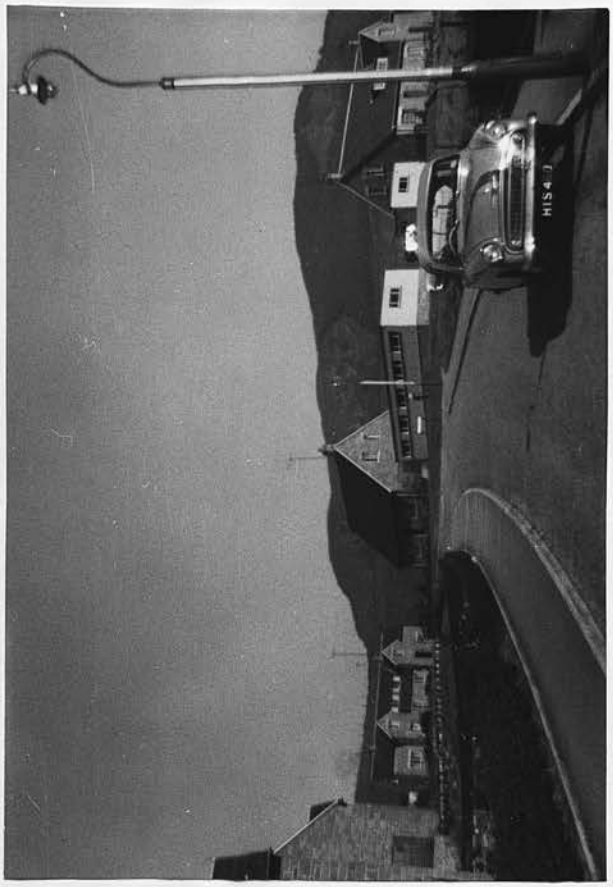

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CHAPTER 14

HYDRO-ELECTRICITY AND FORESTRY - THEIR ECONOMIC IMPLICATIONS

The social and economic implications of both industries are closely entwined and already, elsewhere in the paper, certain references have been made to the subject matter of this chapter.

The Board have virtually completed their developments in the Tummel Basin and consequently, there is unlikely to be any increase in the number of hydro employees and dependents now resident. By contrast, forestry, particularly state forestry, is in the initial stages of development and will eventually employ a much greater labour force than it does at present.

Fig. 69 shows numbers employed in the 3 major state forests over the period 1949-60. One will recall that Allean was the earliest state project hence, initially, the relatively large number of people employed during planting. Latter-:ly numbers have declined but will increase as planting commences on the recent acquisitions at Foss and Kynachan. Glen Errochty shows a similar trend although planting commenced somewhat later. Again the recent Dalno acquisition will add to the labour employed. Much of Rannoch was only recently acquired and hence the labour force is only beginning to build up as planting gains momentum. Con-:sequently, the total labour force employed in state forestry is expected to show a substantial increase within the next decade.[a] While planting proceeds in Rannoch, the earlier plantings in Allean will be ready for thinning. By 1970 the earlier plantations in Glen Errochty and Rannoch will also have reached the thinning stage. State forestry will not, however, reach full rotation until much later, 1990 or 2000, when the first mature timber from plantations will be felled.

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[a] By contrast, the agricultural population is expected to decline still further as witnessed during the past decade (Fig 60). To date, hydro-electric and forestry operations have not had any marked effect on the local supply of agri-:cultural labour, most men in both industries having been recruited from else-:where. This seems to be substantiated by study of the statistics tabulated in Fig 60. Those who left agriculture would probably have moved in any case. However, if the Commission do substantially increase the present basic wage of forest workers as advocated in the previous chapter, this could promote diffi-:culties for the agricultural industry with regard to labour supply.

By then, even supposing that no further acquisitions are made by the Commission - this is unlikely - the Commission's labour force may well be three or four times its present size. In addition, one will recall that at present it is the Commission's policy to detail much of the thinning work and the cutting and extraction of mature timber to private contractors and consequently, as the forests mature, the numbers employed by such concerns will correspondingly increase.

To date, the Government has given much financial inducement through various schemes[a] to private growers to extend the acreage of managed woodlands on their estates. Owing to the disproportionate size of the Atholl Estates, the greater part of the private woodland acreage will continue to be grown on land owned and managed by them. Again private woodlands will provide additional employment to contractors, although on the Atholl Estates such work is at present done and is likely in the future to be carried out by their own employees.

A conservative estimate would suggest that state, private and contractor forest work may well employ about 400 people in the Tummel Basin by the end of the present century, thus making forestry by far the largest single employer of labour in the region.[b] When one further considers that the Commission's policy is to replace single personnel with married men as the years pass, it seems probable that together with dependents, the industry may support about 1500 people by the year 2000.

Neither of these estimates take into account the probable establishment of wood processing factories. Some years ago it was suggested that a chipboard mill might be established at Ballinluig (Tummel-Tay confluence). Nothing, however, became of this suggestion owing to the relative shortage of mature timber then pertaining in the district. Ballinluig, though just outwith the confines of the area under study, has a number of factors to commend it for the siting of such an industry. Firstly, there is abundant power (hydro-electricity) at hand. Secondly, it is easily accessible to most of the Tay Basin and to a considerable

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[a] Pages 109 and 110

[b] Tourism may well employ a greater number, but this would be mainly seasonal despite the suggested winter sports development at Pitlochry and neighbourhood.

acreage of woodland, both private and state owned, within the Commission's East Conservancy. Thirdly, it is located astride the A9 and main railway line linking Perth to the North. One will recall[a] that the successful establishment of such an industry depends on there being an abundance of raw material (timber) nearby and good communications to both raw materials and markets. In Ballinluig there ought to be no difficulty in acquiring the necessary labour and, if needed could easily be drawn from the nearby Lowlands, including Perth. Difficulties might, however, be encountered on finding a suitable location at Ballinluig for the siting of an industry on this scale.

At present, most of the thinnings from forests in Perthshire go to the coal-:mines of West Fife, Clackmannan and Stirling. Recent contraction in the coal-:mining industry and the rapid increase in the volume of thinnings now being cut from woodlands, makes it imperative to find additional outlets for thinnings. A feasible solution may be found if a Swedish Ari Mill for the production of small-sized sawn timber similar to the one at present in commission at Strachur, Argyll,[b] were established in Highland Perthshire. Since woodlands in the southern part of the area are for the most part more mature than those in Tummel Basin, Ballin-:luig, Dunkeld or Aberfeldy would seem more suitable location for an industry of this type, than say, Pitlochry.

At Blair Atholl Sawmill (Atholl Estates) estate timber is cut and treated to provide materials both for home use and for selling. Machinery installed includes a "Forresian" Rack Bench, power by a 35 H.P. electric motor and a Bezner Peeling machine of 5 H.P. Tables, 14 ft. and 8 ft., together with an assortment of fenc-:ing material, may be made to order. A Pratchitt Pressure plant is also installed where wood may be given "Full Cell" treatment.[c] Production in this latter process may reach 1,000 cu.ft. per week.

At present, there is little enthusiasm for establishing small wood industries, such as the hand carving of wooden articles which would find a ready outlet, either directly from the workshop or via Pitlochry shops, to tourists. It is difficult

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[a] Pages 243 and 244

[b] Page 112

to fathom reasons for this but the following may be partially responsible. Firstly, there is little current unemployment in the Tummel Basin and hence little desire to see new industries established. Secondly, housing is scarce and thus the establishment of such an industry would have to depend on local enthusiasm and labour rather than from outside. Thirdly, there is a demand for ready hard cash - probably resulting from the high wage rates earned in hydro-electric construction work over the past fifteen years. In this last named respect small wood industries cannot compete and hence any suggestion of establishing same would be unlikely to receive much local encouragement. The writer would further suggest from his knowledge of local people that even on a part-time basis, such an industry would be unlikely to receive much encouragement from them. Fourthly, unless all finished goods were sold locally - a crafts' centre could do much here - freight charges may become an issue militating against their manufacture locally, unless established in a few selected places.

One may be excused regret that the publicity given to the Board's hydro-electric schemes has not had more success in attracting new industry - light engineering is a suggestion. Of the miscellaneous industries earlier referred[a] to, only the small boat building business at Faskally could be inferred as being directly related to the presence of the Board's scheme. Knowing John Rollo's enthusiasm for attracting new industry to the Highlands and his own successful efforts at Easdale (Argyll), Inverasdale (Ross) and Wick, there is every possibility that his car polish factory at Kinloch Rannoch might well have been established even had hydro-electric power not been available. Undoubtedly, existing industry and tradesmen have greatly benefitted from the availability of a mains supply - the welding business at Pitlochry being a notable example.[a] The presence of abundant power augurs well for the establishment of any new industries, notably wood processing, in the future.

The absence of a differential rate of freight charges for the Highlands is undoubtedly a major factor precluding industrial development north of the

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[a] Pages 361-364

Highland line. It is more economic to transmit power to a Lowland site than to establish industry in a Highland locality. Further, land owner and tourist interests offer little encouragement to the establishment of manufacturing in-:dustry in areas noted for their scenic beauty like much of the Tummel Basin. Certainly, one of the joys of Pitlochry to the visitor is its apparent lack of industry but as one knows, industry does exist, so surely there should be no real difficulty in reconciling new small works of modern design with existing amenity and tourism.

For long, Pitlochry has featured as a favourite place for retirement, con-:sequently, the younger age groups within the population constituted a smaller proportion than average and most young people were able to find employment in local manufacturing industry, trading, agriculture, tourism, or in Perth. But with the injection of a younger element into the population consequent on hydro-electric and forestry development both within the burgh and elsewhere, there is greater need to provide additional employment locally. As yet this need has not made itself felt to any great degree for the families of most hydro and forest employees are of school age. But in the near future as these children leave school and are joined by others from new families brought into the area in consequence of the Commission's expanding forest programme, the current con-:dition of full employment may be replaced during the 'sixties by growing unem-:ployment. State forestry is unlikely to ameliorate this problem unless forest workers' wages are substantially increased. At present very few sons of forest workers seek employment with the Commission primarily because basic wage levels currently offer little incentive to recruitment. Tourism may absorb some of the surplus labour in summer but in winter will tend to aggravate the problem further unless plans to convert Pitlochry and Atholl into winter sports centres reach fruition. Generally, the establishment of wood processing industries and light engineering would seem to offer the best solution but would do little to alleviate female unemployment - except in clerical work - where the best prospect would seem to lie in the expansion of the existing woollen industry (Macnaughtons).

At present, demand for female labour fluctuates sharply according to the season, being largely determined by the needs of the tourist industry.

The writer was not conscious of much local awareness to the problem of providing jobs locally for the ever increasing number of young people who will be seeking employment over the next decade. Undoubtedly, the boom in tourism and hydro-electric developments - both of which have helped create full employ-:ment over the past decade - are largely responsible. But construction work in the latter is nearing completion and while tourism ought to be encouraged by every available means to expand still further, it is not good economics "to put all one's eggs in one basket". Neither is it sound policy to seek to increase the number of people who commute daily between Pitlochry and Perth as this tends to foster a desire in those who travel to seek accommodation nearer to their place of employment (Perth) and in so doing, contributes to a drift of people away from the area. Pitlochry experienced a fair increase in population and prosperity in the fifties but if this trend is to continue in the 'sixties, then a wider variety of industry than pertains at present is a necessary requis-:ite.

Elsewhere in the basin there is little immediate hope of new industry being established - there is an urgent need for new industry in Blair Atholl to offset unemployment created by contraction in existing industry[a] - while state forestry, though destined to expand, will continue, for reasons already stated, to depend mainly on labour recruited from outwith the region. Local geography is not conducive to the attraction of private industry. Wood industries on a small scale, perhaps initially established and operated by the Commission, may become a feasible proposition once the state forests mature. Tourism will continue to offer a valuable, though seasonal, means of employment throughout the area, particularly in the Rannoch-Tummel glen.

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a Page 329

FIG. 69 TUMMEL BASIN - TRENDS OF EMPLOYMENT IN STATE FORESTRY (1949-60)

Forest	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Allean	20	15	16	16	11	9	11	7	9	9	9	8
Glen Errochty	-	2	1	2	7	5	8	4	3	5	6	5
Rannoch	18	15	14	16	15	15	15	18	15	19	28	39
	38	32	31	34	33	29	34	29	27	33	43	52

Figures relate to the number of persons employed annually as at 30th September. The totals do not include foresters or assistant foresters. Faskally is excluded as numbers employed are insignificant.

CONCLUSION

"The history of the economic transformation which a great portion of the Highlands and Islands has during the past century undergone does not repose on the loose and legendary tales that pass from mouth to mouth; it rests on the solid basis of contemporary records, and if these are wanting, it is written in indelible characters on the surface of the soil". 196

These words, written nearly 80 years ago in a Highland Report, may well be applied to the effects wrought by the works of the North of Scotland Hydro-Electric Board and the Forestry Commission in the basin of the River Tummel. Two decades have witnessed a transformation which is already "written in indel-:ible characters " on the physical, social and economic geography of the region. Yet despite much initial pessimism, this transformation, particularly that wrought by hydro-electric development, has been carried through with a minimum of disturbance to amenity, fisheries and local land use. Some adverse effects have followed notably the dewatering of the Upper Garry, the effects of fluctua-:tion in river levels on fisheries and the submergence of a considerable acreage of valuable bottom land at Loch Tummel, the last named constituting a substantial loss to local farming, the effects of which have since been only partially offset through more intensive use of the remaining land. Wherever practicable, the Board have taken the initiative to offset any disturbances or losses which have occurred, notable examples being, fishery research, the re-stocking of rivers and lochs, the construction of fish passes and the use of stone for the building or facing of dams and power stations. Compensation flows, mainly for fisher-:ies, are maintained in most river courses, while in places agriculture has benefitted from the flood control exercised by the Board's dams. Overall, their works have proved an added attraction to tourists while the roads reconstructed or built by them have proved a valuable contribution to both tourism and the local economy in general.

The advent of state forestry offers a solution to the problem of right land use. Success in this field depends largely on the successful integration of forestry with hill farming, notably sheep. Although initially agricultural interests viewed the Commission's large scale acquisition of land in the Tummel

Valley with alarm, there is evidence that present relations between the two sides are in the main fairly good and show signs of further improvement. This seems due in no small measure to the fairly even balance which has been main-:tained between the two interests, particularly in the more recent acquisitions. The Commission may be further complimented on their efforts to safeguard amenity wherever practicable and notably in the steps they have taken to preserve the character of the famous Black Wood of Rannoch.

It was pleasing to note the contribution being made by the private woodland owner and the large acreage of woodland already under dedication. A number of estates, notably Atholl and Bonskeid, offered evidence of the successful inte-:gration of farming and forestry.

State forestry, in particular, undoubtedly advances prospects of repopula-:tion. Already some 60 people are employed and over 200 supported by the in-:dustry although it is as yet in the initial stages of development. These numbers are expected to increase several times over as the forests attain full rotation towards the end of the century, thus greatly contributing towards the repopulation of the area. Unfortunately, the social success of this venture is at present clouded by the necessary recruitment of a type of labour - consequent on low wages - not readily adaptable to life in a rural environment and by siting forest houses, in some instances, in locations which show a lack of social fore-:sight on the part of the Commission. Consequently, the contribution of forest families to local community life is less than expected.

The value of private forestry as a means of repopulation is much less re-:stricted but private woodlands may serve as a means of making more efficient use of estate labour and of absorbing and retaining former agricultural labour which may otherwise have drifted from the district.

By virtue of the number of hydro-electric schemes, their presence has fur-:nished a permanent addition of about 250 people to the region. Their value may best be gauged from the new demands they create for merchandise and conse-:quently, trade and the variety of new ideas and outlook they bring to bear on

local life which in many cases is successful in providing the necessary initia-:tive and leadership upon which the resuscitation of rural life depends.

Electricity is not as widely applied domestically as expected in a region so rich in power supplies. Largely for financial reasons many premises, par-:ticularly in the eastern half of the basin, remain unconnected to a mains supply. For similar reasons much more use could be made of electricity in farming. By contrast, the presence of the Board's schemes and the application of electricity has greatly boosted tourism which has greatly expanded over the past decade. Despite this, much tourist potential remains untapped and if ever a public road is constructed between Rannoch and Glencoe as advocated should follow the Board's and Commission's proposed road schemes at Laidon, this would provide the basis for a great new tourist circuit in the Central Highlands, greatly boost tourism in the whole Rannoch-Tummel glen and provide a new link between the East and West Highlands to the economic advantage of both.

With one exception, electricity has as yet brought no new manufacturing industries to the Tummel Basin although existing industries, notably in Pitlochry and Blair Atholl, have benefitted. Local geographical considerations seem weighted against the establishment of privately financed new manufacturing industry. Consequently, forestry and tourism would seem to offer the best prospects for future employment but the success of the former as a future em-:ployer of local labour will depend largely on the provision of more attractive rates of pay for forest workers. The establishment of wood processing indus-:tries might seem a natural development as the state forests mature although geographical considerations would again tend to favour their establishment out-:side the bounds of the region other than perhaps at Pitlochry, by reason of the large volume of cut timber which such industries demand.

In view of the findings of this report the writer believes that the necessary planning and action for the successful future social and economic development of Rannoch and Atholl can only become really effective within the framework of a development authority, as advocated for Strathglass and inferred

in Section II, Part 1. Despite certain shortcomings, the Board and the Commission have created great prospects which can be turned to considerable advantage if only they are realised to the full. Firstly, it is necessary to collate information and statistical data so that a complete picture of the social and economic needs of the area may be obtained, which, after study and assessment, must be followed by the putting into practice of a plan of action. Too often we have witnessed the first part of such a plan without the necessary practical follow through - for the region of study, the "Tay Valley Plan"[150] is a case in point. Neither the Board nor the Commission, despite the former's statutory obligations, can be remotely described as development authorities within the framework of the current defini-:tion of that term. Only a development authority has the means and the power to co-ordinate the social and economic implications of hydro-electric and forestry developments together with other considerations in the implementation of such a plan of action. Therein lies the crux of the matter.

PART 3 MID-ARGYLL

CHAPTER 15

HYDRO-ELECTRICITY

A. THE SCHEMES - A DESCRIPTION

Unlike the other two regions, hydro-electric generation in Mid-Argyll is not confined to one river system. The absence of any large rivers on the scale of the Beauly or the Tummel has resulted instead in the construction of a number of indiv-:idual schemes which, with the exception of the Sloy and Shira groups, are small and of only relatively local importance. There are seven schemes, five already completed - Sloy, Allt na Lairige, Shira, Kilmelfort and Tarsan (Striven) - and two still under construction, namely, Glashan and Nant.

Loch Sloy

The Loch Sloy hydro-electric scheme was the first major scheme begun by the Board and provides an excellent example of how a natural catchment basin may be in-:creased by means of tunnels and aqueducts. The original catchment basin was $6\frac{1}{2}$ square miles. To-day, as a result of the Board's works, some 32 square miles of rain-soaked mountain country (the average rainfall is about 130 inches per annum but in wet years may exceed 150 inches)[a] drain into the loch which itself has been doubled in length.

The great advantage of this scheme is its position, a mere 40 miles from the centre of Glasgow, thus the station has been designed primarily to meet the peak load demands of industrial Clydeside. For many years Loch Sloy was considered a suitable source of hydro-electric power and the potentialities of the area were examined at various times from 1906. In 1937, an idea was forwarded to instal purely reversible hydraulic equipment with a total capacity of 360,000 kW. to meet peak load demand in Central Scotland. Water would have been discharged into Loch Lomond through the turbines and then pumped back again into Loch Sloy during off-peak periods. Survey also showed the feasibility of extending the catchment basin by trapping water from adjacent areas. For various reasons these ideas were shelved and it was not until 1944 that the North of Scotland Hydro-Electric Board revived interest in developing Loch Sloy. Work commenced on the present scheme in

[a] See Fig. 17

1945 and the plant became operational in 1950.

Before the present scheme began, Loch Sloy was a small shallow loch 788 ft. above sea level in a hanging valley set in the hills high above the north-western shore of Loch Lomond. By means of a great concrete dam 160 ft. high - nearly as high as a six storey building - and 1600 ft. long,[168] the level was raised some 147 ft. creating a gross head of 910 ft. The dam is heavily buttressed on the down-stream side to bear the great weight of water pressing against it. Water is taken by a two miles long tunnel and pipe-lines through Ben Vorlich to a gener-:ating station at Inveruglas[169] on the shore of Loch Lomond. The tunnel and pipes are normally full of water under great pressure so that the four turbines, each developing 45,000 horse power, can be started up quickly and effectively. Operat-:ing speed can be reached within five minutes - of considerable advantage in meet-:ing peak load demand - and when run at full capacity, approximately one million gallons of water pass through the turbines per minute. As a safety measure to control the great fluctuations in pressure when the turbines are stopped or started, a surge shaft has been constructed at the outlet of the tunnel on the Loch Lomond side of Ben Vorlich. For the last 1000 ft. four pipe-lines plunge down the slope to the power house.

Although the present plant incorporates a straight-forward hydro-electric station with a total installed capacity of 130,000 kW. and an annual output of about 120 million units, Loch Sloy does offer a possible site as earlier envisaged, for pumped storage working in conjunction with nuclear power such as that under construction at the Pass of Brander on Loch Awe.

Allt na Lairige

Some distance to the west of Loch Sloy is the Allt na Lairige Scheme which, though small (6,000 kW.), is of interest in that it was the first pre-stressed concrete dam to be built in Scotland if not in the world. A small reservoir has been created in the glen of the Allt na Lairige, a hanging tributary valley of Glen Fyne. Water is led from here to drive a small turbine located in Glen Fyne. The plant operates on a head of 817 ft. and produces an average of 20 million units

per annum.

Shira

The Shira Scheme incorporates two reservoirs at different levels in the hang-:ing valley of the upper glen. The upper reservoir is known as Lochan Shira and the lower as Lochan Sron Mor. Lochan Shira has a top level of 1125 ft. O.D. and stores the run-off from a catchment area of 13 square miles. Water from Lochan Shira discharges through a small generating station (Sron Mor) where plant of 5000 kW. capacity and an average annual output of 6 million units is installed, into Lochan Sron Mor the gathering ground of which extends to a further 8 square miles. The station operates on a head of 160 ft. This part of the Shira scheme is unique in the history of hydro-electric development in Scotland for here was incorporated the first pumped storage unit ever to have been brought into commis-:sion, a forerunner of the great pumped storage schemes of the future. The station is designed as a reversible pumping unit enabling water collected into Lochan Sron Mor from its catchment area - this has been extended by beheading the head streams of the Allt an Stacain draining to Loch Awe - to be pumped up into the upper reser-:voir, Lochan Shira, so as to increase the storage of the latter. This is done mainly at weekends when demand for power is low, although it may also be brought into commission when rainfall conditions are such that the lower reservoir cannot contain the whole discharge from its catchment area. In this latter case water which would otherwise have had to be allowed to go over the spillway is stored for future use. As with the lower reservoir, the natural catchment of Lochan Shira has been extended through an extensive network of aqueducts and tunnels to tap water from the upper tributaries of the River Fyne and the Allt Coire Lair - a tributary of the River Lochy - while diversion also takes place from the Allt an t-Sithein, a tributary of the River Shira.

From Lochan Sron Mor the combined yield of both catchment basins discharges under a head of 965 ft., incidentally the second highest head utilised so far in any of the Board's schemes, through the hills by tunnel to an underground power station at Clachan on the shores of Loch Fyne, about $\frac{1}{2}$ mile from where the River Fyne flows into the loch. This is the largest station of its kind at present in

commission. The station has an installed capacity of 40,000 kW. and an annual output of 74 million units, its main purpose being to supply the power needs of a large area of Kintyre, Mid-Argyll and Bute, and to transmit surplus power to Sloy to help meet peak load demand.

In both the Allt na Lairige and Shira schemes part of the catchment yield is allowed down the Rivers Fyne and Shira as compensation water to meet fish requirements.

Tarsan (Strivan)

In lonely Glen Tarsan in Cowal, to the north-east of the head of the long sea arm of Loch Strivan, the Board have created a new reservoir somewhat comparable in area to Loch Sloy though not in capacity. The creation of this reservoir now referred to as Loch Tarsan, necessitated the creation of two dams, a major one across the floor of the glen about a mile upstream from the shores of Loch Striven and a smaller dam across the watershed between Glens Tarsan and Lean to prevent loss of water down the latter once the new reservoir was full. A small station of 6,000 kW. and an annual output of 19 million units of electricity on the shore of Loch Striven near Lochhead, utilises a gross head of 403 ft., the water being led by tunnel through the southern spur of Meall an Fharaidh.

Water is also diverted to the existing power station by a later extension to this scheme. The head waters of a number of small streams which formerly flowed into Loch Riddon have been collected by a series of aqueducts at about 500 ft. O.D. and diverted through a pressure pipe to the power station, the pipe being buried where it crosses the flat land at the head of Loch Striven. About one-quarter of the total output of the station is produced from the water utilised by this part of the scheme.

Kilmelfort

The Kilmelfort Scheme was built largely to supply the needs of the Oban area. Formerly this area was supplied by distribution lines from Rannoch and Shira.

This scheme involved the damming and enlargement of two natural lochs, namely, Lochs Tralaig and na Sreinge for storage and the flooding of the floor of the Pass of Melfort by the construction of the dam 45 ft. high across the River Oude, about

half a mile upstream from the confluence of the Oude and the Eas Tarsuinn. At the seaward end of the gorge near Melfort, a power station of 2000 kW. capacity operat-:ing on a head of 365 ft. generates some 9 million units of electricity per annum.

Water is diverted from the Allt Braglenmore - a tributary of the River Euchar - into Loch na Sreinge so as to boost storage.

Glashan

At Glashan work is still in progress. The original loch will be greatly en-:larged once the scheme is completed through the damming of and the diversion of water by aqueducts from the River Add and the Abhainn Bheag an Tunns. From the dam which is 45 ft. high and 1,100 ft. long, water will be led to a power station on the shores of Loch Gair a short distance north of Lochgair village. This scheme will have an installed capacity of 6000 kW. and an annual output of 18 million units. It will utilise a gross head of 356 ft.

Awe (Nant Section)

The greater part of the Nant Section of the Awe Scheme and approximately 150 sq. miles of the total Awe Catchment (324 sq. miles), lie within Mid-Argyll. Work is at present in progress on this scheme. Loch Nant which is situated about 600 ft. above sea level to the north west of Kilchrenan, will be enlarged to about four times its present area by a dam across the River Nant close to the present outlet of the loch. Storage will be increased by the diversion of water from streams draining west to the Atlantic. Water will then be led by a tunnel from the south shore of the loch - water is also diverted into this tunnel from streams presently draining to Loch Awe - to an underground power station near Inverinan on Loch Awe. Here, plant of 18,000 kW. capacity producing an average of 27 million units per annum will be installed. The station will operate on a gross head of 564 ft. and utilise a catchment of 17 sq. miles.

In each of the last four schemes described, the Board had to take into account the effects of water abstraction through diversion on fishings, notably salmon fishings, in the Rivers Ruel, Euchar, Add and Nant. When preparing the schemes, certain clauses were incorporated into agreements reached between the Board and local fishing interests as to the provision of adequate compensation water into

these streams. This will be considered later in more detail.[a]

The economic generation of power at Tarsan, Kilmelfort, Glashan and Nant was only made possible by greatly extending the natural catchments through diversion of water from neighbouring streams. This is well illustrated by the Glashan Scheme where the natural catchment of Loch Glashan has been enlarged to nearly six times its former area and at Tarsan, where water is brought by tunnel in one instance from a stream four miles distant. To accommodate such work necessitated the initial construction of a considerable mileage of access roads over exceedingly difficult terrain.

When the Nant and Glashan schemes are completed the Board will have plant to the capacity of 213,000 kW. installed in Mid-Argyll producing an average of 293 million units per annum. Statistical data of the various schemes is listed in Fig. 72.[b]

In addition to the hydro-electric schemes just described, the Board operate a small diesel station at Dunoon which is run intermittently to help meet peak load.

At Glenmore House, Kilmelford, a privately owned hydro-electric scheme is still in commission. Water is drawn from Loch an Losgainn Mor in the neighbour-:ing hills and works a turbine of 110 kW. capacity operating on a head of nearly 500 ft. Until now the plant has been sufficient to meet the normal requirements of Glenmore Estate and the nearby village of Kilmelford except the hotel which has a mains supply, although during dry weather there have been occasions when the scheme has ceased to function owing to the limited capacity of the loch. In con-:sequence of this latter disadvantage and increasing local demand, the estate and village seem likely to be connected to a mains supply within the near future. It is of interest to record that this privately owned plant has been in operation since 1933.

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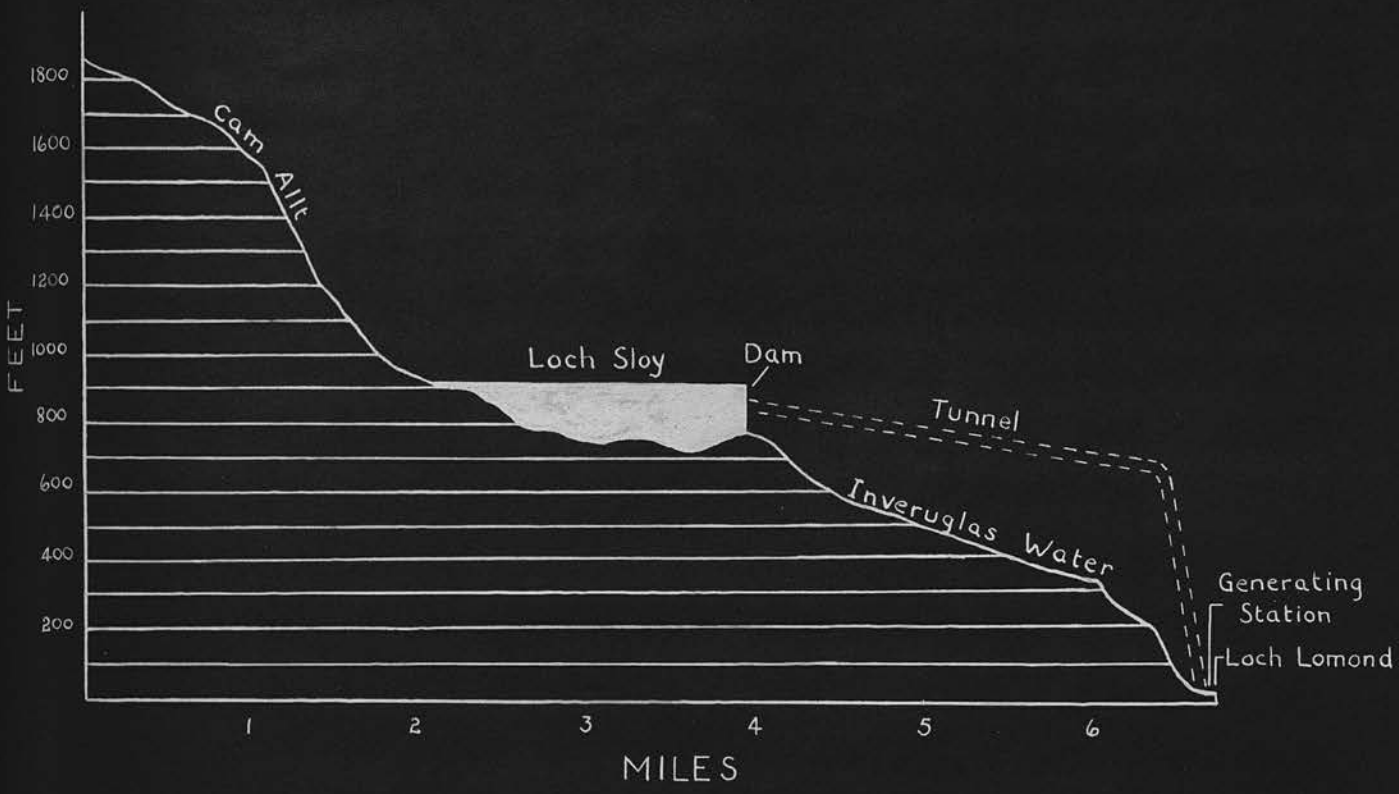
a See under "The Effect on Fish Stocks and Fishings".
b See also Figs. 70, 71A, 71B and 71C.



LOCH SLOY

FIG. 70. MID-ARGYLL - RIVER PROFILE SHOWING SUITABILITY OF LOCH SLOY SITE FOR HYDRO-ELECTRIC DEVELOPMENT

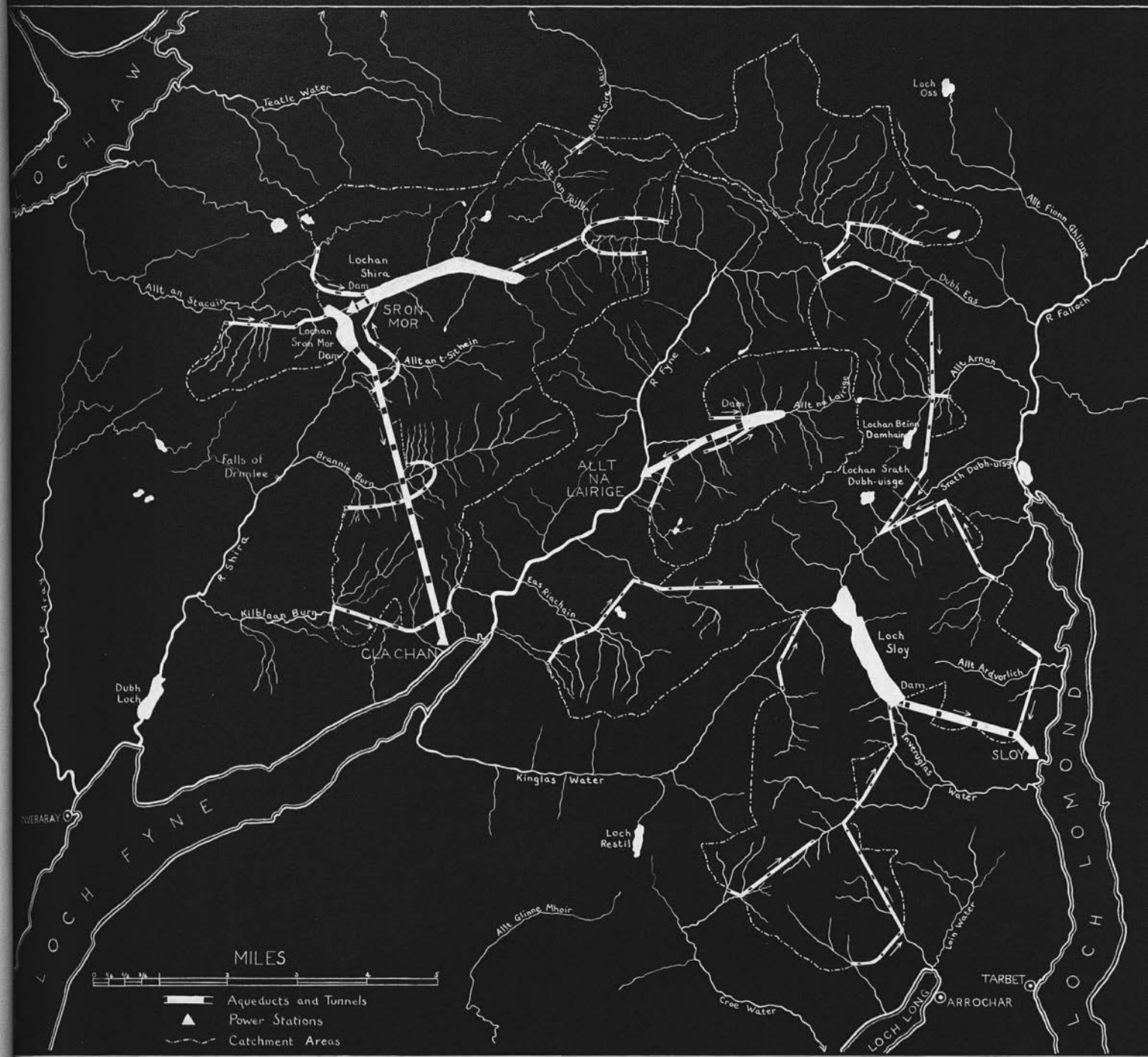


FIG.71A. MID-ARGYLL - LOCH SLOY, ALLT NA LAIRIGE AND SHIRA HYDRO-ELECTRIC SCHEMES

FIG. 71B. MID-ARGYLL - KILMELFORT, TARSAN AND GLASHAN HYDRO-ELECTRIC SCHEMES

FIG. 71C MID-ARGYLL - AWE (NANT SECTION) HYDRO-ELECTRIC SCHEME

FIG. 72 MID-ARGYLL - STATISTICAL DATA OF POWER STATIONS

Scheme	Station	Catchment Area (Sq. miles)	Catchment Area Av. Rain-:fall (inches)	Gross Head (feet)	Dam	No. of Setts & Capacity (kW)	Total Plant Cap. (kW)	Est. Av. Annual Output (millions of units)
Sloy	Inveruglas	32	130	910	Loch Sloy	4 x 32,500	130,000	120
Allt na Lairige	Allt na Lairige	5	112	817	Allt na Lairige Res.	1 x 6,000	6,000	20
Shira	Sron Mor	13	112	160	Lochan Shira	1 x 5,000	5,000	6
	Clachan	21	112	965	Lochans Shira & Sron Mor	1 x 40,000	40,000	74
Tarsan (Striven)	Striven	15	80	403	Loch Tarsan	2 x 3,000	6,000	19
Kilmelfort	Melfort	10	50	365	Oude Res.	1 x 2,000	2,000	9
Glashan#	Glashan	24	70	356	Loch Glashan	1 x 6,000	6,000	18
Nant (Awe)#	Inverinan	17	70	564	Loch Nant	1 x 18,000	18,000	27
							213,000	293

Under Construction (1960)

B. CHANGES IN THE PHYSICAL ENVIRONMENT

(i) THE EFFECT ON LAND USE, IN PARTICULAR AGRICULTURE

The broken topography of Mid-Argyll, the impervious nature of much of the under-:lying rock, the high relief and the resultant heavy rainfall, presented the Board with somewhat different opportunities to those already discussed in the Beauly and Tummel basins. Nowhere were there rivers to compare in length and volume with either the Beauly or Tummel, neither were there any substantial fresh water lochs. Nevertheless, the short swift flowing streams could be relatively easily controlled by the construction of dams of no great width due to the conformation of the hills and valleys, while the high density of the stream pattern made catchment extension by means of aqueducts and tunnels a feasible proposition. The following table gives an indication of the acreages of land inundated as a result of hydro-electric construction work.

Scheme	Area Inundated Acres	
Sloy	280	
Allt na Lairige	94	
Shira: Lochan Shira	380	461
Lochan Sron Mor	81	
Tarsan	272	
Kilmelfort: Oude	30	
Loch Trallaig	70	106
Loch na Sreinge	6	
Glashan	322	
Nant	480*	
	2015	

* Estimated acreage. Land is not yet flooded (1960) at Nant and Glashan.

With the exception of a small acreage of improved land at Oude, the land submerged was classed as rough pasture. This follows from the elevation or remote-:ness of the schemes (related to the physiography of Mid-Argyll) and may be con-:trasted with losses in the Tummel Basin. Consequently, losses in terms of acreage were of minor importance. However, the presence of a new or greatly enlarged loch may interfere with the ease of movement of stock and may hinder access to certain grazings. Further, the construction of a dam may submerge existing roads or

tracks which, if not replaced, may inconvenience the hill farmer. Such effects have already been encountered and discussed at Mullardoch and Monar in Chapter 5B(i). Are results similar in Mid-Argyll? The following studies which relate to Sloy and Kilmelfort are indicative of the effects of the schemes on local farm-:ing in the region.

Sloy

Prior to the scheme the grazings on either side of Loch Sloy - Ben Vorlich, Ben Vane and Beinn Dhubh - formed part of the outrun of Stronafyne farm near Arrochar. The farm which in addition included grazings on either side of Glen Loin extended to 5000 acres. After completion of the scheme, the hills on either side of Loch Sloy continued to be grazed for some time but to-day are no longer utilised for stock. The problem of maintaining the grazings was first accentuated when the loch began to fill after the dam was completed. Eventually all the flat bordering the former shore and the track along the east shore was submerged. The latter had facilitated the conveyance of shepherds to a bothy at the head of the glen so making the work less arduous. The bothy was also lost. But the raising of the loch level raised further complications for farming. A contour map of the area prior to the scheme, clearly demonstrates the implications which would follow if the loch level were raised 150 ft. as under the scheme. The most notable re-:sult would be that the hills on either side would then shelve so steeply into the water as to make the movement of men and animals on the slopes above exceedingly dangerous. The danger would be greatly increased in mist, during or after heavy rain, or, when the ground was snow covered, all of which are conditions commonly experienced in the vicinity of Sloy. The extra time required to marshall sheep under such conditions ought also to be considered. This is the position to-day under the scheme and largely because of the difficulties entailed, the grazings on both sides of the loch have been abandoned. The grazings are now worked only as far as the Allt Coiregrogain and Uglas Water. 2000 acres have been given over.

One must, therefore, conclude that the scheme has at least contributed to the clearance of sheep from the grazings on either side of the loch. But to place

the blame entirely on the scheme despite the ensuing difficulties would be an irresponsible conclusion to make for two other factors seem to have had some bear-:ing on the ultimate decision of abandoning the grazings. Firstly, the grazings were of poor quality so their loss was not a serious one. Secondly, the con-:struction of the scheme seems to have coincided with difficulty in acquiring suitable labour for the farm. Whether with increased manpower the grazings would have continued to have been utilised despite the consequent effects of the scheme is difficult to ascertain. It is improbable that the farm could have economically employed more men. Overall, it seems that the labour problems then prevailing finally tipped the balance in favour of withdrawing stock permanently from the Sloy grazings. In view of the fact that a number of local men were employed on construction work at Sloy, one may be led to believe that the presence of the scheme may have been responsible for agricultural labour problems, but there is no indication of this from local agricultural statistics.

Arrochar Parish

Year	No. of Agricultural Workers
1938	20
1948	23
1954	21

When examining these figures one ought to consider that employment at Sloy also reached a peak in 1948, consequently, it may be deduced that the labour prob-:lem at Stronafyne was rather an expression of the nation-wide scarcity of skilled shepherds and stockmen than one following from the presence of the hydro-electric scheme.

Although actual figures are lacking, the number of sheep carried to-day (1960) on Stronafyne is approximately the same as prior to the scheme. Hoggs continue to be wintered away. The former suggests that the grazing must previously have been seriously understocked and that while the scheme has in large measure been responsible for the clearing of stock from some 2000 acres of hill land at Sloy as a seemingly permanent feature of local hill farming economics, the remaining land is now more intensively worked, this no doubt having been made practicable by the various subsidies paid to hill farming since the late war. One may conclude,

therefore, that economically Stronafyne has suffered little adverse effect from the scheme although certain readjustments in the administration and organisation of the farm have been necessary in order to maintain output.

Probably the greatest advantage following from the scheme was the installa-:tion of a main's supply of electricity at Stronafyne in 1948. This was done without difficulty as to costs. Despite the loss of land, relations with the Board are good. In fact the farmer did stress that in all his dealings with hydro employees and contractors, he had always found them most co-operative and helpful, particularly during construction work, in reducing disturbances to a minimum. These feelings were endorsed elsewhere and serve to illustrate the cordial rela-:tions which exist between the North of Scotland Hydro-Electric Board and agricul-:turalists throughout Mid-Argyll.

Kilmelfort

The accompanying table lists the properties affected together with a broad classification of the land inundated by the scheme.

	Property	Loss through inundation
Loch na Sreinge and Lochan a' Bhailis	Finneglen	Mainly rough grazings
	Druimnashallaig	"
	Pollanduich	"
Loch Tralaig	Corrielorne	Mainly rough grazings
	Innie	"
	Reray	"
	Pollanduich	"
Oude Reservoir	Reray	Mainly rough grazings
	Melfort Home Farm	A small acreage of arable

Total acreage submerged - 106

Some of the properties referred to are simply grazings and no longer consti-:tute individual subjects, for example, Innie is worked from Corrielorne.[a]

To obtain a general indication of the effects of the scheme, the writer called on Corrielorne, the major sheep farm and subject most affected by the scheme. The farm may be reached by way of a very rough track, the Board having made no attempt to reconstruct the road to the Trallaig dam. The Board were, of

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[a] On the local O.S. One Inch Sheet (Fig. 24), Corrielorne is wrongly referred to as Corriciornie.

course, under no obligation to improve the road initially, but the resultant wear and tear of the movement of heavy construction equipment and lorries to and from the dam site can scarcely be said to have been conducive to the retention of the original unpaved surface. It is difficult to conceive that the road could have previously been in a worse state than it is now. Further, the bridge over the River Oude near the junction with the A816 may be crossed by vehicular traffic accordingly at one's own risk. Considering the Board's fine record in road im-:provement elsewhere and their work on the Kilmelfort Scheme in general, it is, therefore, the more disappointing to find that little or no effort has been made to improve this road, particularly since the needs of construction work at the dam site must, in no small measure, be held responsible for its present pot-holed, rutted surface.

Corrielorne and Innie are worked as one unit, the submergence of the track to the latter having in a sense contributed to their amalgamation. The land sub-:merged extended to 40 acres and although rough was flat and of wintering value. A greater loss was ease of access to the hill grazings on the south side of Loch Trallaig. Formerly these were reached by way of a bridge over the Oude about the site of the present dam. Since the loss of the bridge, the grazings have been given over and stock numbers (sheep) have decreased slightly but the tenant emphas-:ised that if he had so wished the reduction could easily have been made up by more intensive use of the pastures on the north side of the glen.

At present (1960) the farm carries a stock of 1000 sheep and 30-40 hill cattle, all wintering being done at home. The open winters experienced make wintering at home a favourable proposition but, nevertheless, there is a limit to the number of animals which can safely be carried over the winter. Formerly hoggs were wintered away at Nairn but costs - 30/- per head - were considered excessive. It seems, therefore, that the present carrying capacity of the farm is determined rather by the tenant's desire to winter at home than by any changes consequent on the presence of the scheme.

Like Stronafyne, no difficulties were encountered at Corrielorne as to obtain-

:ing an electricity supply. Indeed, electricity was installed free of cost and, consequently, the house is all electric. The farm buildings are lit by elec-:tricity and at time of visitation, the tenant was seriously considering acquiring electric clippers to assist with the shearing. Electricity has undoubtedly proved a great boon and practical blessing at Corrielorne for, although situated only about one mile from the Oban-Lochgilphead road (A816), the farm is essentially re-:mote.

Land submerged elsewhere as a result of the Kilmelfort scheme has been of no consequence to agriculture. Undoubtedly, the greatest value of the scheme has been the provision of electricity to all farms and houses in the district which were not previously served by the privately owned hydro-electric scheme on Glen-:more Estate.

The observations made at Sloy and Kilmelfort clearly indicate that the losses sustained have been insignificant in consequence of the limited value of such land. More pertinent would seem the loss of access to, or limitations imposed upon, the utilisation of grazings by the submergence of tracks, bridges or bottom land, which formerly facilitated approach to these grazings. Yet on this account the effects of the schemes have been considerably modified by greater use being made of the remaining grazings which, having been previously understocked, were able to accommo-:date displaced stock without undue difficulty. It is, of course, true that had Stronafyne been carrying a capacity head of hill sheep prior to the scheme, then the loss of ease of access to two-fifths of the grazings might well have had ser-:ious repercussions on the economy of the farm. In this case the bulldozing of a new track by Loch Sloy to the head of the glen would then have had to have been seriously considered. Finally, considering that electricity has been made widely available to farms in Mid-Argyll and with beneficial results, any hardships ex-:perienced through the raising of existing lochs or the creation of new ones are more than compensated for.

Flood Control

In a number of places agriculturalists have already benefitted, or in the

future, will gain advantage from the control exercised by the schemes on river flows. A notable example is the flat floor of lower Glen Shira which closely resembles Strathglass in that for long it was subject to periodic inundation. A short distance from the mouth of the glen is the Dubh Loch which is connected to the salt water of Loch Shira by the Gearr Abhainn (short river), a mere ½ mile in length. Both loch and river are at sea level, consequently, the latter runs both ways depending on the state of the tide. When high tides coincided with heavy rainfall it was natural that much of the low ground became unsafe for stock. Under the Shira scheme rainfall is no longer a threat, consequently, the threat of flood-:ing has been greatly diminished to the benefit of local agriculturalists. In Glen Fyne the control exercised by various schemes on the tributaries of the River Fyne has similarly greatly reduced flooding, so adding to the grazing value of the low ground. To a lesser extent flooding has suffered diminution in Glendaruel since water was diverted from the Garvie Burn - a tributary of the River Ruel - into the Tarsan scheme.

However, the Glashan scheme will ultimately be of greatest value in this re-:spect once the River Add is brought under control. The susceptibility of this river to flooding may be gauged by examination of the local Six Inch Ordnance Map where the words "Liable to Flooding", are printed several times on land adjacent to the river. Flood control under the scheme should also further facilitate reclamation of the former peat bog of the Moine Mhor for agriculture.

Roads

The mileage of roads constructed, diverted or reconstructed in Mid-Argyll as a result of the Board's operations is much less than in either the Beauly or Tummel basins but, nevertheless, is of local benefit. The following table based on information obtained from the Board shows road improvements carried through at the various schemes.

Sloy	-	¼ mile reconstructed
Allt na Lairige	-	1 mile reconstructed
Shira	-	1 mile of new road, 3.4 miles reconstructed
Kilmelfort	-	0.7 miles reconstructed(A816)
Tarsan	-	1 mile of new road

No figures are listed for Glashan and Nant as both schemes were still under

construction at the time (1960) when the above information was acquired.

Perhaps of greatest value was the improvement of the road[170] in Glen Shira which not only has promoted access to grazings and for stalking and shooting on the Inveraray Estates, but also allows visitors to reach the Shira dams and Sron Mor power station.

Inevitably one must conclude that on balance the Board's operations in Mid-Argyll have been beneficial to those whose business is in agriculture. Land may have been lost or is now understocked through submergence or restriction of access to grazings but the availability of electric power, the exercise of flood control and the provision of new or improved access roads - this last mentioned is of particular value at Shira - have all served towards easing the burdens of the hill farmer.

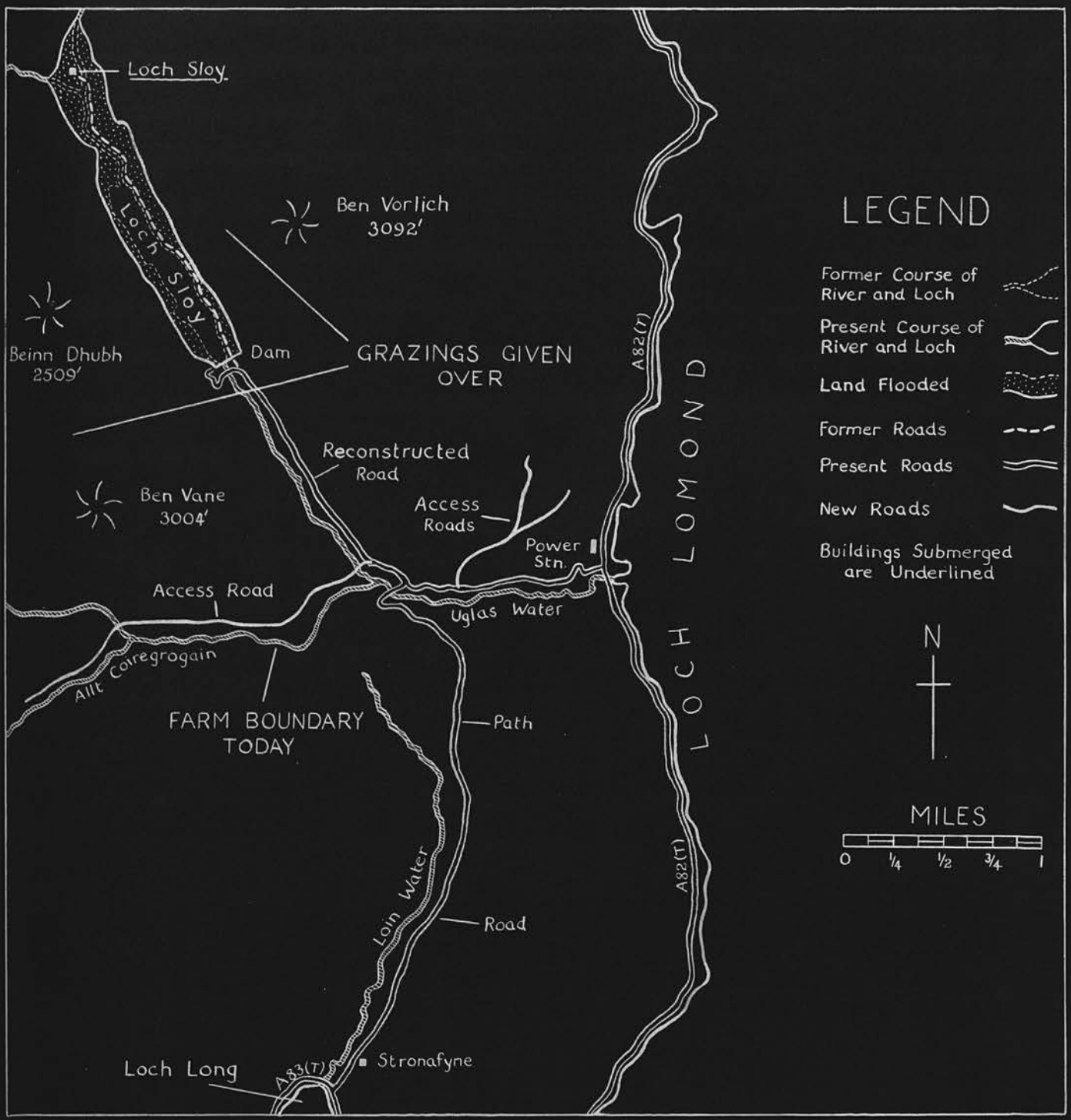

FIG. 73. MID-ARGYLL - LAND AND PROPERTY LOST OR AFFECTED BY INUNDATION AT STRONAFYNE, AND ROADS LOST, DIVERTED OR RECONSTRUCTED AS A CONSEQUENCE OF THE LOCH SLOY HYDRO-ELECTRIC SCHEME

(ii) THE EFFECT ON AMENITY

Unlike the Beauly and Tummel basins, amenity proved much less pertinent a question when the Board's schemes in Mid-Argyll were first promoted. This may seem surprising, especially since the Sloy Scheme was designed to include pipes above ground and a power station on Loch Lomondside. The Sloy Scheme did feature in a Public Inquiry held in Edinburgh in December 1944 - January 1945, but the main objection offered was that raised by Dunbarton County Council over the question of water supply, the Council maintaining that Loch Sloy featured in their plans as a future reservoir to meet increasing demands for fresh water. A prudent and happy ending to the conflicting claims to the waters of the loch was finally reached through the Hydro Board agreeing to be bound by contract to supply, if necessary, 3 million gallons of water daily from Sloy to the County Council for primary purposes. Since Loch Lomond seems sufficient to supply any future County water requirements it is unlikely that this contract will ever be exercised.

Amenity did feature in the Inquiry as a minor issue. After considering the scenic implications of the scheme, the Committee of Inquiry concluded in favour of the Board. In reaching this decision they appear to have been influenced by the following.

(1) The pipes from the surge chamber to the power station were to be treated with a mat camouflage paint and eventually concealed by plantations. In this way amenity would be safeguarded.

(2) Inversnaid Hotel on the opposite shore blended well with the natural landscape, therefore, there was no reason why, with care, the power station could not be made equally attractive.

(3) Sloy was designed primarily to meet peak load demand and was promoted at a time characterised by power shortages and the inevitable power cuts, therefore, it was in the public interest[a] that the Board be authorised to proceed with the development of this great power potential so near to the heart of industrial Scotland.[b]

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[a] The ultimate test of any scheme is whether or not it is in the public interest to proceed with its construction - Section 5(4) of the 1943 Act.

[b] Sloy lies approximately 40 miles from the centre of Glasgow.

The value of Sloy as a source of readily available power in meeting peak load is an undisputed fact, but has amenity been safeguarded with the care implied at the Inquiry?

Faced with pre-cast Aberdeenshire granite, the power station is attractively finished but since the approach from the south is partially obscured by trees, it is not readily visible except from the loch or the hill immediately above. But the pipes as they exist at present can scarcely be said to enhance the view. The writer was unable to find a satisfactory answer as to why they were placed on the surface in the first place. The answer may be economic but if so, this is sur-:prising considering the care the Board normally accord to the design and finish of their schemes. Neither can it be said that the "camouflage" paint with which they are "adorned" serves much useful purpose, despite assurance given that the colour used is considered by those in authority as the best suitable for the loca-:tion. Finally, where are the trees which by now ought to have largely concealed the pipes? One must conclude that the final product sadly lacks the finish origin-:ally intended and promised. Fortunately, with their being on the same side as the main and only road traversing the length of Loch Lomond, the pipes are less promin-:ent than they might otherwise have been. Consequently, any adverse effects they may have on local amenity is considerably lessened.

One must take care, however, not to judge the scenic effects of a scheme, including pipelines, solely on a physical basis, for experience has shown that many people regard hydro-electric dams, power stations and pipes, as symbols of man's triumph over nature and representative of how the latent resources of the Highlands may be harnessed to man's use and advantage. This is expressed by the thousands of people who visit the Board's works annually and on this account Sloy is no exception. The scheme, undoubtedly, embodies a wonderful feat of civil engineering as may in part be gauged from the accompanying maps, diagrams and photographs. The drenching rains so characteristic of this corner of Scotland and so often distasteful to both locals and tourists, are now making a worthwhile contribution to the country's economy. Hundreds of people annually visit the power station and dam site, the latter being reached by a three miles long access

road which climbs steeply from its junction with the A.82 near the power house. The road leads to the top of the dam which visitors may cross on foot. From the top excellent views may be obtained along the entire length of the loch, and in the opposite direction to the cone-shaped peak of Ben Lomand which rises majestic-:ally above the distant shore of Loch Lomond. The site, particularly below the dam, still bears scars dating from the time of construction. These will eventual-:ly heal but, nevertheless, if a number of trees were planted on the residual ridges and knolls as was likewise suggested for Mullardoch[a], the scene could be greatly enhanced. One might argue that Loch Sloy is subject to violent wind squalls which would preclude tree growth, but since these blow primarily down the glen, that is, from the north-west, trees on the sites indicated would be fairly well sheltered by the dam. They would further serve to break the monotony of what is at present virtually a treeless landscape.

Despite the shortcomings mentioned, the writer was not aware at any time of any general criticism of the scheme on amenity grounds by the public. The many people who visit it annually are a testimony to its attractions. If one judges scenic values on this basis alone then the scheme must certainly be said to have fulfilled the hopes of its progenitors. One cannot doubt that indirectly Sloy has contributed to the tourist appeal of this part of Loch Lomondside.

Allt na Lairige is remote from the public eye but the writer was most impress-:ed by the efforts being undertaken by the Board to enhance the new reservoirs in Glen Shira, especially Lochan Shira. At time of calling (August 1960), a squad of men were busily engaged in landscaping the shores of the loch adjacent to the dam. Much remained to be done but the accompanying photographs 171,172 bear evidence of the completed work. The Shira dams may be approached by the glen road 170 which has been substantially improved by the Board. Glen Shira has many historic associa-:tions with the past. It was by way of this valley that Montrose's men in the mid-17th Century passed to pillage and ravage the domains of MacCailein Mor[b], while nearly a century later, after the ill-fated '15 Rebellion, the noted Rob Roy sought refuge within its confines. His house, now roofless, stands under the shadow of

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[a] Page 167

[b] The hereditary patronymic of the Duke of Argyll

Creag an Fhithich. The glen is also noted for its wild life, particularly the buzzard and the occasional eagle. As yet few tourists seem aware of the new road but those who are have favourably commented upon it as it provides ready access to a glen seldom before visited. The Clachan Power Station being underground is quite imperceptible to the passing tourist.

At Tarsan, the generating station was obviously designed and has been successfully built to harmonise with local farm buildings. The pipeline from the dam to the power station has been almost entirely concealed by the planting of trees. For a similar reason, the pipeline on the opposite side of the glen leading from a later extension to the scheme, is not readily discernible. As suggested by the Amenities Committee when the scheme was first devised, the pipe has been buried where it crosses the flat at the head of Loch Striven.

The power station at Glashan is housed in a contemporary styled stone building close by the A83 and near Lochgair village. This station eminently illustrates the Board's regard for amenity for they have preserved all possible trees - mixed but mainly deciduous - originally on the site. One could say that the station has been virtually built round the trees, the net result being a building of which both the architect and contractors concerned may be justly proud. An access road has been constructed from the power station to the dam site.

At Kilmelfort, 0.7 miles of the Oban-Lochgilphead road had to be realigned to accommodate the new Oude Reservoir, the presence of which has somewhat enhanced the local scene. The old river course immediately below the dam is but a rocky memory but at the power station water is again discharged into the river. The power house is tucked away in the bottom of the gorge and consequently, is seldom visited by tourists. The increase in the areas of Loch Trallaig, Lochan a' Bhailis and Loch na Sreinge are of no account scenically.

Work had only just begun at Nant at time of calling, consequently, it is not easy to visualise the finished product. However, there is no reason to believe that the scene after completion should be less pleasant than at present. One ought also to consider that the loch is remote and so changes wrought in the natural landscape are of less consequence.

In conclusion one must credit the Board with having carried out their schemes in Mid-Argyll with due regard to amenity. In terms of landscape change one must, at least in part, except Sloy from this otherwise reputable performance, for the pipes leading to the power house sadly detract from the natural scene. Perhaps as at Tummel Bridge[111,112] nature may yet, in the absence of any endeavour by man, repair the damage by clothing the lower slopes of the hill with a covering of mixed oak/birch scrub[a] so making less discernible the harsh outline of man's handiwork.

In some places, as in the Tummel Valley, it was not always practicable to site and route transmission pylons and power lines unobtrusively. This is par-:ticularly so at Sloy but like Errochty, the station is the main control for a group of stations, namely, Sloy, Allt na Lairige and Shira, with further connec-:rions to both the Highland and South of Scotland grids.[b] Naturally, this has en-:tailed the erection of transmission lines additional to those serving Sloy alone. A switching station is sited about $\frac{1}{2}$ mile west of the power station.

Despite certain criticisms levelled in this paper and suggestions made as to site improvement at Sloy, this does not detract from the general competence with which the Board have carried through the construction of their schemes in Mid-Argyll. The past decade has witnessed a steady increase in tourism throughout the region, largely in consequence of its accesibility from Glasgow. There is evidence that the schemes have themselves proved added attractions and the new or improved roads popular diversions to visitors.

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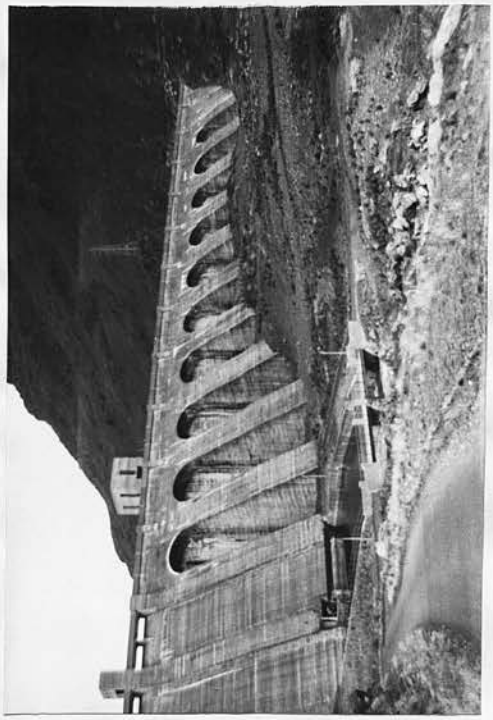
[a] This is a common association on Loch Lomondside. The absence of sheep should hasten the establishment of scrub.

[b]



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168. Sloy Dam. The dam is 1,160ft. long and 160ft. high.

169. Sloy Power Station and Pipes, Inveruglas.

170. Glen Shira Road after reconstruction by the Hydro Board. This road (9 miles long with passing places) permits access to the dams and power station at the head of the glen.

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171. Landscaping of the Loch Shore near Dam, Lochan Shira, Glen Shira.

172. Outlet of Diverted Flow from neighbouring Hill Burns, Lochan Shira.

173. A Rocky Memory - the River Oude below the Oude Dam, Kilmelfort.

(iii) THE EFFECT ON FISH STOCKS AND FISHERIES.

Earlier, in Parts 1 and 2 of this Section, the reader may recall the controversy raised over the effects of hydro-electric schemes on fish stocks and fishings in the Beauly and Tummel basins. In Mid-Argyll this is less of an issue since the region contains no rivers of fishing renown, at least in comparison with the other regions studied, consequently, fishery protection figured much less in the planning and designing of power schemes. At Sloy, the largest scheme of all, no "safeguards" were required which may seem surprising until one recalls the peculiarities of the catchment of Sloy. Elsewhere, the Board have acted on recommendations made by their own advisers and by the Fisheries Committee. Where practicable such recommendations were accepted either fully or in modified form. Considerable effort has been made to allow for the discharge of compensation water of sufficient quantity into any streams diverted or harnessed by the Board wherever fishings were considered of sufficient value as to warrant their protection and maintenance.

Since the preservation of fishings constitutes but a minor issue in hydro-electric studies in Mid-Argyll, any assessment of the effects of the latter on local fishings does not warrant the time nor detail with which this subject was considered in Parts 1 and 2. Further, to pass any final judgement at present as to the effects of individual schemes can only be done by drawing on rather sketchy evidence since all schemes, with the exception of Sloy, which is exempt from consideration for reasons stated, have been in operation for only a relatively short time or, in the case of Glashan and Nant, are still under construction. However, the following notes list the various precautions taken for the protection and maintenance of fishings under individual schemes, together with comments thereon.

Shira

In Mid-Argyll, primarily on account of the small size and consequent volume of streams utilized by the Board, certain recommendations were made and latterly agreed upon that no water should be abstracted from a stream unless the natural flow at the point of abstraction reached a fixed volume, this being determined as the minimum flow considered necessary for the maintenance of fish life. In determining what

the fixed volume should be, consideration was made as to the effects on the parent river to which the stream was tributary. Such a recommendation was incorporated into the abstraction proposals for the Allt an Taillir, which, although tapped to provide additional water for the Shira Scheme, is a major headstream of the River Fyne, a notable spawning river.

Locally, the Shira is noted for its runs of salmon and seatrout from Loch Fyne an d for its brown trout. To safeguard fish life generally, but in particular, trout, the following scheme with regard to compensation flows is currently in operation.

Throughout the year a minimum flow of 5½ million gallons per day is maintained over the Drimlee Falls by way of compensation water from the dam at Lochan Sron Mar, in lieu of the fact that both the Allt an t-Sithein and Brannie Burn are now diverted into the tunnel leading to the Clachan Power Station. This volume is supplemented by natural drainage from numerous hill burns to a minimum of 8 million gallons per day below the confluence with the Kilblaan Burn.

More pertinent to the needs of migratory fish is the additional provision that annually between June and September (both months inclusive), there are 8 periods (not less than 2 per month) each of 48 hours duration and spaced at intervals not exceeding 3 weeks or less than 1 week, when the flow below the confluence with the Kilblaan Burn is increased to a minimum of 45 million gallons per day.

The significance of this latter provision is that the increased flow, at least in volume, does pertain to the conditions which occur during a natural spate and so helps draw migratory fish upstream to the spawning grounds. Fish cannot ascend beyond the lower dam as the greater part of the upper glen, now submerged, did not warrant the construction of fish passes. It remains to be seen whether the loss of former spawning redds in the upper glen together with certain tributary streams (now dry), will have any future adverse affect on salmon and sea trout stocks in the River Shira, but so far, local fishing interests (Argyll Estates) seem to consider the provisions made by the Board as adequate, although the compensatory flows and freshets are somewhat less in volume than those originally recommended by the Fisheries Committee when the scheme was first devised.

Allt na Lairige

Below the dam the Allt na Lairige is now almost dry, but water is returned to the River Fyne by way of the power station. Screens erected on the former just above its confluence with the Fyne prevent migratory fish from trying to ascend to the dam.

Because of the abstraction of water from the Allt an Taillir (no water is abstracted if the flow is less than 3 million gallons per day) and the diversion of several streams to the Sloy catchment (these formerly joined the Fyne in its lower reaches), the flow in the Fyne was somewhat lessened. Consequently, the Board removed certain obstacles now exposed through low water to ease the movement of migratory fish. This was done to the satisfaction of the local proprietor (Ardkinglas Estate).[a]

Kilmelfort and Nant.

These schemes are considered together as their catchments will have interrelated effects on the flows of neighbouring rivers and consequently on fishings.

Prior to the construction of the Kilmelfort Scheme, salmon were excluded from ascending the Oude by the falls in the Pass of Melfort. When the scheme was first devised, the Fisheries Committee recommended that the Board take steps to incorporate into their scheme provision for freshets of sufficient quantity so that the proprietor of the local fishings might retain the opportunity of developing the Oude as a salmon river.[b] Although this recommendation was not accepted by the Board, they did agree to maintain a flow of 2 million gallons per day in the river below the generating station and to erect a heck[c] to prevent salmon or sea trout entering the tailrace. To safeguard the future of the River Euchar as a salmon stream, the Board agreed to release into the Allt Braglenmore (one of the former's major tributaries and now diverted to the Oude catchment) between 1st June and 10th October annually, water of sufficient quantity as to enable salmon to ascend the parent river with relative ease.

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[a] A parallel may here be drawn with the Tay Basin where a grant to the local river board was in part given by the Hydro Board for the removal of obstacles which were known to impede the access or egress of migratory fish.

[b] This would have initially required blasting away the falls to improve access. As the proprietor had no immediate intention of carrying through such a scheme, the Committee's suggestion was rejected.

[c] For definition, see page 291.

The future of the Euchar fishings are also dependent upon an adequate flow being maintained in the Allt an Loin Mhoir and Eas Coire Seilich at periods crucial for fish migration. Consequently, both streams are scheduled for only partial diversion to Loch Nant. Under provisions incorporated in the latter scheme, no water will be abstracted from either stream if its flow is less than $1\frac{1}{2}$ million gallons per day, but when greater than $4\frac{1}{2}$ million gallons, then the whole flow may be abstracted. When the latter conditions prevail as a result of heavy rainfall, other streams will also be at a high level and so provide the Euchar with the necessary water. The Euchar provides an interesting example whereby a fine balance has been created between fish and hydro-electric requirements but only the future can provide an answer as to the success of the operation.

Compensation water to a maximum of 2 million gallons per day will be discharged into the River Nant below the dam site. Although by no means generous, this is considered satisfactory by the Awe District Fisheries Board in view of the unhindered drainage of hill streams below this point.

Glashan

In the absence of any major streams draining into Loch Glashan, the Board required to make provision for the diversion of water from the headstreams of the River Add. When in commission, water will be drawn from both the Add and its major tributary the Abhainn Bheag an Tunns, but no water will be abstracted from the former unless the flow is in excess of 5 million gallons per day and in the latter, 2 million gallons per day. Further, during the summer season (June to October, inclusive), freshets to the volume of 17 million gallons per day in the Add and 7 million gallons per day in the Abhainn Bheag an Tunns, will be discharged on each of 20 days over the period. Aqueducts will be screened to prevent migratory fish having access to Loch Glashan and fish ladders provided - this is the only scheme in Mid-Argyll to have them - to by-pass the intakes on both streams.

Despite the initial "threat" to the Add fishings, no objections were lodged against the scheme on this account. This alone would seem proof that the provisions for water abstraction allowed for under the scheme are considered adequate, not only

by the Board and the Fisheries Committee, but by local proprietors and anglers.

Tarsan

As with the previous scheme, much water is drawn from outwith the naturalcatchment, that is, from the Garvie Burn, one of the headstreams of the River Ruel. However, no water is abstracted unless the flow in the former exceeds 4 million gallons per day. When in excess of this figure, water is increasingly abstracted until at 7 million gallons, the total flow is diverted, for reasons similar to those already expressed for the River Euchar (Nant Scheme). Again fish are screened from entering the intake pipe.

Since its creation, Loch Tarsan has been annually stocked by the Board with yearling trout from commercial hatcheries, consequently, it provides a valuable new water for angling, the fishings being managed by the Dunoon Angling Club. The following table gives an indication of the stocking carried through by the Board and catches made on the loch in recent years.

Loch Tarsan[a]

	Brown Trout		
Year	No. of fish planted	No. of fish caught	Weight of fish caught (lbs.)
1957	3000	1405	815
1958	3000	999	594½
1959	3000	544	276
1960	3000	371	211
1961	1000	573	364

No figures were readily procurable as to catches made on beats prior to and since schemes became operational but the general indication is that fishings, at least to date, have not suffered adversely since the Board commenced operations in Mid-Argyll. The care manifested by the Board as to the volume and timing of compensatory flows, particularly seasonal flows, to aid the access and egress of migratory fish, was

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[a] The fluctuations in the number of fish caught may reflect weather conditions and the number of rods fishing. No statistics as to the latter were available. One must remember that the loch is an entirely new reservoir on a stream (Glen Tarsan Burn) of no former fishing importance and that the successful stocking of a reservoir may depend on many factors too involved to be discussed here, therefore, despite the apparent limited success at least so far of the stocking in relation to angling returns, the Board might be complimented on their initiative and effort.

favourably commented upon. Although the flows agreed cannot be considered as generous, they are, nevertheless, considered as adequate by those concerned. On this account one ought to further consider that in Mid-Argyll rivers and catchments are small and consequently, only at considerable expense and effort has it been possible to make them usable for successful hydro-electric generation. Were it proposed to increase current compensatory flows this may well, if adopted, jeopardise the economic generation of electricity from these schemes.

It is pleasant to record that there is little if any of the antagonism between local vested fishing interests and the Board of the nature expressed on the Tummel/Tay. The stocking of the new reservoir at Tarsan has proved a welcome gesture to local anglers and might with success be extended elsewhere - Lochan Shira is a suggestion. One must remember, however, that the Board is under no obligation to stock reservoirs. Overall, Mid-Argyll provides a number of interesting examples of how the seemingly opposing claims of fishings and hydro-electric generation may be reconciled successfully to the satisfaction of all interested bodies. However, as earlier suggested, time alone will witness as to the ultimate success of the steps taken by the Hydro Board towards the maintenance of fish stocks and fishings in the rivers now under their control.

C. ELECTRICITY - ITS APPLICATION IN THE DAILY LIVES OF THE PEOPLE

In the Home

In Mid-Argyll consumers have not been slow to partake of the advantages of a mains supply of electricity particularly for lighting and heating. The services of the Board to all classes of consumer can hardly be overestimated and everywhere, one is aware of the high esteem with which the name of the North of Scotland Hydro-Electric Board is revered by local people. In the burghs and villages many house-holders have been "all electric" for several years and since the Kilmelfort and Tarsan schemes were commissioned - the output of these is essentially for local supply and will soon be further boosted by Glashan - a silent revolution from paraffin and calor gas to electricity has been slowly but surely extended to all rural areas including the more remote districts of Loch Aweside, Craignish and Knapdale. This change over is nearing completion and it is now common place to find electric cookers and other gadgets in everyday use on remote farms and crofts.

Between 1st April, 1948, and 31st December, 1957, the number of electrical consumers in Argyll increased from 9400 to 20270, an increase of 116%. Expressed another way, this constitutes a rise from 45% to 86% in the number of potential consumers. By the end of 1960, the figure had reached 89.3%, those remaining to be connected being mainly island communities, for example, Jura, Colonsay, Gigha, parts of Mull and Iona, or resident in the northern fastnesses of Ardnamurchan and Morvern. Since then, it may be satisfactorily noted that both Jura and Gigha have been linked to the mainland grid by underwater cable and that premises on both islands are in process of connection. In the summer of 1962, the mainland grid was also extended to Iona. These connections, together with corresponding increases elsewhere, have now (late 1962) raised the percentage of electric consumers to over 90% in the country. In the writer's estimation the corresponding figure for Mid-Argyll probably exceeds 95%.

While the social well-being of the population of Mid-Argyll may well rest on a multiplicity of factors, there can be no doubting that through making electric power available to what is virtually the whole population of the region, the North of

Scotland Hydro-Electric Board have greatly contributed to the comforts and conveniences of local people. By providing the rural dweller with the modern and necessary amenity of electricity, there are grounds for believing that this has had an encouraging effect on reducing population drift. While such can never be adequately determined statistically, there is evidence from field survey that people have been encouraged to remain in the region on account of electricity now being available. Likewise, the availability or non-availability of electricity may raise implications with regard to finding people to serve in posts of education and local government administration in remote areas. For example, the very fact that a schoolhouse has electricity may be the determining factor whereby the local school continues to have a teacher. One might well echo the words of the parish minister of Lochgoilhead when, in summarising the advantages of electricity to the local community, he wrote: "Electricity has come to the parish and is a wonderful boon".[237]

On the Farm

An even better assessment of the extent of rural connection may be gauged by considering that between 1948 and 1957, the number of farms connected to the grid in Argyll rose from 45 to 810, that is, an increase of 147%. No figures are available for Mid-Argyll alone but in 1960, electricity was being brought to Loch Aweside to what seemed to be the last few remaining farms still unconnected in the region.[a] The advantages of electricity on a farm even for heating and lighting alone, needs no mention here.[b] That farmers are aware of the further applications of electricity was demonstrated at Corrielorne, Kilmelford, where, for example, the acquisition of electrically operated clippers to assist in sheep shearing was being considered. Electricity is successfully applied to dairying, particularly in Cowal and notably near Dunoon and in Glendaruel. In addition to milking, electricity can and is being applied to meet such dairying needs as an instant hot water and steam supply for the proper cleansing of utensils, for sterilizing and for milk separating, churning, butter and cheese making and ice cream. While there remains ample room for the expansion

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[a] Page 452 .

[b] Page 192 .

of dairying on individual farms and crofts particularly in view of the ever increasing flow of tourists, the present trend in Mid-Argyll is towards the rearing of beef calves at the expense of dairying. This is especially true away from the main centres of population and is related to both economics and the lack of man-power. For the latter reason, some farms are no longer cultivating their former arable, a fact illustrated by the decline in the acreages of crops and grass in the region between 1938 and 1960 (- 14%).[a] There is also a trend for many farms to produce but one crop - hay or silage - and so no longer to practise any form of rotation or to buy in fodder instead. In the west, at least, this latter trend is likely to be held in check by the high cost of freight either by steamer or road transport.

Government subsidy and the run-down of man power by stimulating a desire to rear suckled calves - where farms have dairy cattle, these are crossed with a beef bull to obtain calves, if not, the calves are bought in - and the trend towards the production of hay and silage at the expense of other crops, are indicative of the silent revolution now taking place in agriculture in Mid-Argyll. This provides increased opportunity for the application of electricity to the industry. The artificial drying of hay by the circulation of electrically heated air would be of inestimable benefit to hill farming and with this in mind, the Board have already experimented in grain and hay equipment.[b] Further, the vitamin and protein value of artifically dried hay is high, consequently, calves would both gain weight and mature more quickly. Economics would not allow electrical drying equipment to be established on every farm

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[a] The reader is referred to references made in Parts 1 and 2 of this Section, with regard to hay and grain drying equipment. More recently (Autumn 1962), the Board, in conjunction with the North of Scotland College of Agriculture and R. G. Garvie & Sons, Ltd., Aberdeen, developed a new high volume dual-purpose hay and grain drier which "blasts" moisture from the crop. The drier is produced in two sizes, a larger and a smaller, the former for three-phase supply and the latter for single-phase. To date, approximate electricity costs for hay drying average £1 9/- per ton. Considering that 60% of the hay crop in a West Highland locality may be lost through adverse weather conditions, the effects of artificial hay drying, if widely applied, would be revolutionary.

[b] Fig. 84.

and croft. Some of the larger farms might well acquire their own units - this might also be done on an estate basis - but in general, communal units, each serving the needs of a local district might be installed, as obviously the more often a drier was used, the more economic it would become.

The writer is aware that the general temperament of the Mid-Argyll farmer and crofter may raise difficulties to the successful application of communal driers to local agriculture. As earlier referred to, it is the acreage and use made of the inbye, which ultimately governs the number of beasts a subject can carry,[a] so obviously if the output of this land can be improved and extended through the application of electricity in the form described, then we are indeed on the threshold of a new and more prosperous era in Highland agriculture. Considerable re-organisation in the traditional methods which epitomise Highland farming will be necessary. This will present difficulties but these must somehow be overcome if full advantage is to be taken of the opportunities presented. All concerned must come to realise that if hill farming in Mid-Argyll or elsewhere is to remain viable in the face of ever increasing competition both from within and without this country, change will be necessary within the industry to meet changing circumstances within an ever changing world. The ultimate goal must be the greatest possible utilisation of every acre of land and if electricity helps to make this practible, then its application in all its forms should not be further delayed. Considering that at time of writing (late 1962), there is a likelihood that agriculture subsidy[b] will be reduced and perhaps

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[a] Page 17.

[b] The Hill Sheep Subsidy, for instance, has not been paid since 1956. This is a subsidy for regular breeding ewe stocks of hill sheep kept on hill land and managed in accordance with the recognised practices of hill sheep farming. The amount of subsidy may be varied from year to year in relation to the economic position of hill sheep farming as a whole. Since 1956, it has not been considered necessary to make any payment under the scheme.

There is much speculation as to the future of the Marginal Agricultural Production Scheme. Since 1959, the number of farms receiving assistance under this scheme has been reduced.

The success of current negotiations regarding Britain's entry into E.E.C. (Common Market) would seem closely related to our willingness to make changes in our present agricultural policy, notably, a reduction in the subsidies paid to British farming.

ultimately largely dispensed with in the next decade, there is all the more reason that the industry should become more efficient. The difficulties are great but they are not insoluble.

To Tourism

The County of Argyll has for long been a major tourist area. The region of Mid-Argyll although, with the exception of the north-east corner (Inverary - Loch Lomond), scenically eclipsed in grandeur by regions further north, has the great advantage of being within relatively easy reach of Clydeside which has helped it to share in the tourist boom of the post-war era. A further advantage is that it lies astride the main routes, both road and rail, linking Glasgow with Fort William, Oban and the Isles. In terms of hotel capacity the county ranks next to Midlothian (including Edinburgh) and third after Midlothian and the joint Perth and Kinross total, if "bed and breakfast" and board residences are included. Approximately 500,000 visitors are annually accommodated in Argyll, a large proportion of whom are estimated to find accommodation in Mid-Argyll.

Reference was made in Part 1[a] to the advantages of an electricity supply to the hotel industry and to tourism in general. Considering the high percentage of consumers now connected to the grid in Mid-Argyll, there can be few remaining establishments offering tourist accommodation still without an electricity supply.

A popular development of the past decade has been the growing number of caravan and camping sites. One of the largest sites is located on the shores of Loch Long at Ardgartan at the foot of Glen Croe. The larger sites often boast a shop while all have the necessary toilet and sanitation accessories which the law now demands. Electricity may be used for lighting, heating, refrigeration and in the provision of power points.[b] A further advantage of Argyll is that as one of the crofting counties, it shares in the extension to exemption from the licensing requirements listed in the Caravan Sites and Control and Development Act, 1960.[c]

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[a] Pages 187 and 188

[b] Compare with the Milton of Fonab Caravan and Camping Site at Pitlochry, Perthshire.

[c] Pages 167 and 168

What of the future? Three wet summers in a row - 1960, 1961 and 1962 - seems to have reversed, at least temporarily, the steady growth in tourism experienced over the previous decade. Hotels, particularly in Cowal, felt the pinch in 1962. The high average rainfall especially in the north-east will remain a disadvantage, yet given several seasons of more normal weather conditions, particularly in July and August, tourism can recover and develop still further. The combination of mountain, river, loch and sea, especially in Cowal and to a lesser extent along the Atlantic seaboard from Kilmelford to Knapdale, offers scope for the development and establishment of facilities for many sporting and recreational pursuits, for example, pony trekking, mountaineering (the hills around Arrochar), yachting, boating, fresh and sea water fishing. Already 60,000 acres between Lochs Goil and Long form the Argyll National Forest Park, with freedom of access,[a] camping and other facilities open to all. Since the Forestry Commission is already the largest land owner in Mid-Argyll and this venture has already proved eminently successful, it seems feasible to assume that other forest parks may be established in the future. One should also allow for the fact that with growing affluence and mobility and a shorter working week, Mid-Argyll is being brought within the reach of an ever increasing proportion of the industrial population of Central Scotland, not merely for the annual summer holiday but for day and weekend jaunts over perhaps seven to eight months of the year. Further, boating for which Mid-Argyll is eminently suitable is becoming increasingly popular. These considerations would suggest that there is a tourist potential yet awaiting development within the region.

Apart from what has already been written, how can the Board's developments and electricity contribute towards the development of tourism? It is the writer's belief that through the attractions of their hydro-electric schemes, new and improved roads,

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[a] It is not considered that forestry development is necessarily incompatible with further development in tourism. Generally, with the exception of some parts of Cowal, notably around Lochs Eck, Goil and Long, most of the Commission's woodlands are in areas of no great scenic renown. Further, if forestry and tourism be regarded as incapable of existing together, how does one account for the creation of the Argyll National Forest Park and the actual encouragement given to tourism by the Commission?

fish conservation and restocking, and the availability of electrical power, the North of Scotland Hydro-Electric Board have already, both directly and indirectly, contributed - though such can never be measured quantitively - towards the provision of many of those means by which tourism can be expanded and the ideals expressed in the previous paragraph may be realised. Further tourist expansion may well necessitate expansion in dairying, market gardening, servicing industries, accommodation, catering and transportation - electricity could be utilised in a miscellany of ways in the promotion of such developments - the effects of which would benefit the whole economy. While tourism must primarily remain a seasonal occupation, it ought to be encouraged by all available means including the application of electricity, in view of the relative lack of other resources within the region.

To the Non-Residential Consumer

A miscellany of consumers are classed under this category including offices, shops, banks, churches, schools, halls and garages. As an educationist, the writer found it most gratifying that many schools are now equipped with modern electrical appliances for heating, lighting and in the preparation of school meals. A number of new schools have been built within the past decade to accommodate increased school rolls consequent on forest development.

The advantages of electricity to the industrial consumer and its availability as a practical means of attracting new industry to the region are considered in Chapter 18.

CHAPTER 16
FORESTRY

A - AN INTRODUCTION TO STATE AND PRIVATE FORESTRY

State Forestry

Few areas demonstrate more conclusively the growth of forestry as a major form of land use and industry than does Mid-Argyll. The area also bears the distinc-:tion of having the oldest state forest[a] in Scotland where much experimentation in large scale afforestation has since been carried out to the benefit of both state and private forestry. Since 1907, the number of state forests in Mid-Argyll has increased to 17,[b] the land under state plantations representing 7.6% of the total land area in 1960. The following is indicative of the tremendous expansion in state forestry in the county and in Mid-Argyll in the post-war period.

In 1949, the Commission owned 48,317 acres in Argyll. By 1961, this acreage exceeded 300,000 of which over 100,000 acres were already planted - the first county in Britain to top six figures. To mark this achievement a number of com-:memorative trees were planted in the policies of Benmore House[c] by some of the Commission's oldest employees in Argyll. In 1960, over three-fifths of the state plantations in the county - 62,880 acres - and 17 of the 36 forests were in Mid-Argyll. Further, an estimated two-thirds of the 50,000 tons of timber cut in Argyll forests in 1961 came from Mid-Argyll. These figures take no account of private woodlands, yet they clearly demonstrate that forestry is already big busi-:ness within our region of study.

The state forests together with dates of first acquisition are listed below. Most early acquisitions have subsequently been added to. A map showing their location is given in Fig. 74.

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[a] Inverliever.

[b] For management control, Inverliever is subdivided into Inverliever and Eredine, and Kilmichael into Kilmichael North and South.

[c] Benmore House near Loch Eck is one of the four Forester Training Schools in Great Britain (two in Scotland) run by the Commission.

Forest	Date of first Acquisition	Forest	Date of first Acquisition
Ardgartan	1925	Kilmartin	1956
Asknish	1936	Kilmichael-North	1946
Benmore	1925	South	1946
Corlarach	1946	Kilmory	1930
Glenbranter	1923	Knapdale	1930
Glendaruel	1946	Loch Eck	1924
Glenfinart	1926	Minard	1938
Inverinan	1932	Strathlachlan	1946
Inverliever -			
Inverliever*	1907	Tighnabruaich	1954
Eredine	1934		

* Ex-Crown Forest

Fig. 75 shows land use within each forest at 30th September, 1960. With the exception of the recently acquired forests of Kilmartin and Tighnabruaich, only a small proportion of the land scheduled for afforestation remains unplanted. This contrasts with current conditions in both Beauly and Tummel where much of the land still awaits planting. Between 1948 and 1960, the area under plantations in Mid-Argyll increased by 119%[a] - a remarkable achievement - but latterly, the rate of planting has notably slackened as the reserve of plantable land decreased. It may be noted that the total area scheduled for forestry only increased by 20%[a] over the same period. As planting declined, so have the numbers employed in forestry.

One of the four Forester Training Schools in Great Britain is located at Benmore House in Cowal. This school, which was opened in 1929, can accommodate 30 students and provides courses similar to those described for Faskally.[b] The grounds of Benmore - acquired from the Younger family - are run as a botanic garden and contain among many exotic species of shrubs and trees, a fine avenue of Sequoia firs. More recently (1955), the Commission were gifted the fine woodland garden on Cumlodden Estate (Sir George Campbell, Bart.), Loch Fyneside.

To meet local requirements, the Commission own several nurseries in Mid-Argyll. These are at Benmore, Glenfinart, Inverinan, Inverliever and Minard. Not all are in continuous use, nevertheless, of the estimated 120 million trees planted in Mid-Argyll, the majority were reared locally.

State forestry in Mid-Argyll lies within the West Conservancy District with

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a Fig. 76
b Page 327

headquarters in Glasgow.

Private Forestry

Nearly all private woodlands of any consequence are to be found on the estates listed in Fig. 77. With one major exception - Ballochyle[a] - the greater part of the forest land is dedicated or managed under the Approved Woodlands' Scheme. Of an estimated total acreage of 124,000, nearly 14,000 acres were already planted or scheduled for forestry by 1960. Of this latter figure, nearly one-half is dedicat-:ed or approved woodland.

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[a] In 1960, the estate was owned by Messrs Bryant & May, the match manufacturers, but since then has been sold to Economic Forestry, Ltd. It may be that since change of ownership some of the woodland is now dedicated or approved. Much of the woodland on the estate is already productive.

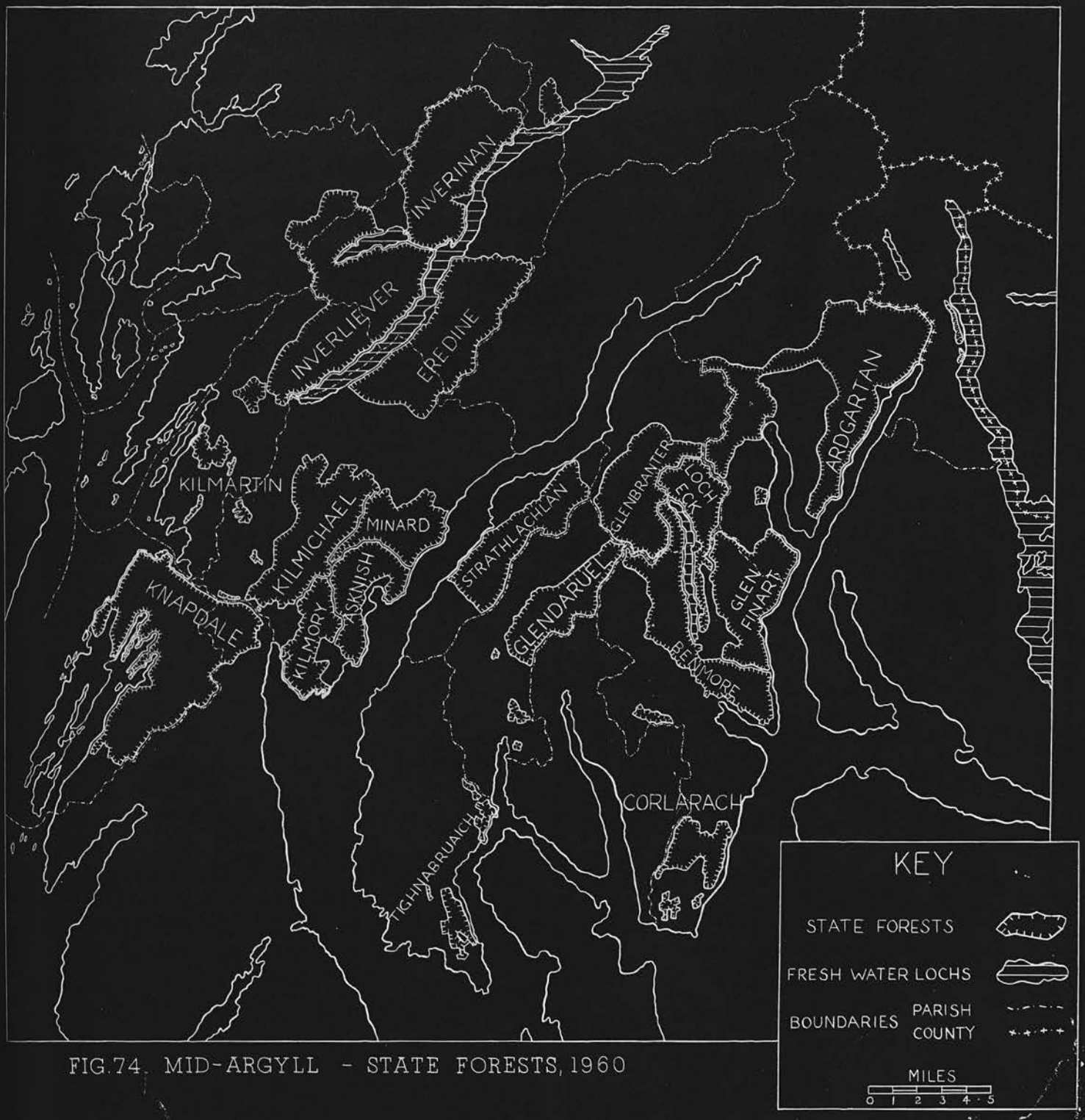

FIG.74. MID-ARGYLL - STATE FORESTS, 1960

FIG. 75 MID-ARGYLL - STATE FORESTS, LAND USE 30th SEPTEMBER, 1960

Forest Name	Land Area Acres	Under Plantations[a] Acres	To be Planted Acres	Total area scheduled for Forestry Acres	Agricultural and other Land Use Acres
Ardgartan	20962	6100 (29.1%)	697 (3.3%)	6797 (32.4%)	14165 (67.6%)
Asknish	5899	3720 (63.0%)	1 (0.0%)	3721 (63.0%)	2178 (37.0%)
Benmore	9300	3131 (33.7%)	294 (3.2%)	3425 (36.9%)	5875 (63.1%)
Corlarach	3962	2437 (61.5%)	130 (3.3%)	2567 (64.8%)	1395 (35.2%)
Glenbranter	9073	3755 (41.4%)	362 (4.0%)	4117 (45.4%)	4956 (54.6%)
Glendaruel	6372	2309 (36.2%)	60 (1.0%)	2369 (37.2%)	4003 (62.8%)
Glenfinart	8712	3196 (36.7%)	45 (0.5%)	3241 (37.2%)	5471 (62.8%)
Inverinan	17888	5649 (31.6%)	2367 (13.2%)	8016 (44.8%)	9872 (55.2%)
Inverliever/ Eredine[b]	29060	6779 (23.3%)	544 (1.9%)	7323 (25.2%)	21737 (74.8%)
Kilmartin[b]	2116	1156 (54.6%)	904 (42.7%)	2060 (97.3%)	56 (2.7%)
Kilmichael[b]	10078	5235 (52.0%)	24 (0.2%)	5259 (52.2%)	4819 (47.8%)
Kilmory	4151	2773 (66.8%)	342 (8.4%)	3115 (75.2%)	1036 (24.8%)
Knapdale	20997	6856 (32.7%)	903 (4.3%)	7759 (37.0%)	13238 (63.0%)
Loch Eck	5501	2416 (43.9%)	26 (0.5%)	2442 (44.4%)	3059 (55.6%)
Minard	5327	3695 (69.4%)	71 (1.3%)	3766 (70.7%)	1561 (29.3%)
Strathlachlan	7615	2702 (35.5%)	266 (3.5%)	2968 (39.0%)	4647 (61.0%)
Tighnabruaich	2462	971 (39.4%)	858 (34.9%)	1829 (74.3%)	633 (25.7%)
Total	169475	62880 (37.2%)	7894 (4.6%)	70774 (41.8%)	98701 (58.2%)

[a] Includes acquired woodland

[b] For management control, Inverliever is treated as two forests - Inverliever and Eredine, while Kilmichael is divided into Kilmichael North and South.

FIG. 76 MID-ARGYLL - EXPANSION OF STATE FORESTRY SHOWING LAND USE OVER THE PERIOD 1948 - 60

Forest Name	Land Area (Acres)					Under Plantations [a] (Acres)					To be Planted (Acres)				
	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960
Ardgartan	18126	18127	18126	20974	20962	4250	4259	4362	4950	6100	1500	953	815	1832	697
Asknish	5900	5900	5901	5900	5899	1488	2358	3723	3745	3720	3075	1248	20	-	1
Benmore	13000	9686	9584	9585	9300	3713	2299	2835	3043	3131	1996	1304	508	300	294
Corlarach	1522	1522	5503	4880	3962	264	803	1577	2257	2437	386	4	736	71	130
Glenbranter	10915	8726	8712	8712	9073	3817	3364	3358	3519	3755	350	274	398	237	362
Glendaruel	6055	6996	6996	7045	6372	161	797	1412	1985	2309	2489	2011	1633	1010	60
Glenfinart	8712	8712	8712	8712	8712	2354	2600	2773	3105	3196	700	32	388	101	45
Inverinan	12795	12796	12796	12796	17888	2509	3020	4268	5121	5649	3078	2762	1433	988	2367
Inverliever/ Eredine	26985	29527	29522	29561	29060	4128	4709	5595	6245	6779	4156	2127	1432	920	544

Forest Name	Total Area Scheduled for Forestry (Acres)					Agricultural and other Land Use (Acres)				
	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960
Ardgartan	5750	5212	5177	6782	6797	12376	12915	12949	14192	14165
Asknish	4563	3606	3743	3745	3721	1337	2294	2158	2155	2178
Benmore	5709	3603	3343	3343	3425	7291	6083	6241	6242	5875
Corlarach	650	807	2313	2328	2567	872	715	3190	2552	1395
Glenbranter	4167	3638	3756	3756	4117	6748	5088	4956	4956	4956
Glendaruel	2650	2808	3045	2995	2369	3405	4188	3951	4050	4003
Glenfinart	3054	2632	3161	3206	3241	5658	6080	5551	5506	5471
Inverinan	5587	5782	5701	6109	8016	7208	7014	7095	6687	9872
Inverliever/ Eredine	8284	6836	7027	7165	7323	18701	22691	22495	22396	21737

Forest Name	Land Area Acres					Under Plantations[a] Acres					To be Planted Acres				
	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960
Kilmartin	-	-	-	1563	2116	-	-	-	305	1156	-	-	-	1202	904
Kilmichael	12687	12687	10930	10055	10078	479	1843	4688	5173	5235	5139	2831	994	63	24
Kilmory	-	3169	3169	3218	4151	-	76	370	2257	2773	-	2026	2044	265	342
Knapdale	19708	19705	19702	19695	20997	4401	4955	6596	6717	6856	2103	1966	113	27	903
Loch Eck	-	5502	5502	5502	5501	-	2412	2412	2413	2416	-	30	30	29	26
Minard	5189	5188	5168	5327	5327	875	1581	2730	3583	3695	1969	1644	800	106	71
Strathlachlan	7316	7616	7616	7616	7615	282	1147	2403	2702	2702	3191	1262	527	266	266
Tighnabruaich	-	-	1171	1174	2462	-	-	107	443	971	-	-	932	586	858
Total	148910	155859	159110	162415	169475	28721	36223	49209	56563	62880	30132	20474	12803	8003	7894
West Conservancy District	226993	249241	262364	276570	322430	56358	70675	94467	112539	125704	46302	35815	25075	21318	34115

Forest Name	Total Area Scheduledfor Forestry Acres					Agricultural and Other Land Use Acres				
	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960
Kilmartin	-	-	-	1507	2060	-	-	-	56	56
Kilmichael	5618	4674	5672	5236	5259	7069	8013	5248	4819	4819
Kilmory	-	2102	2414	2522	3115	-	1067	755	696	1036
Knapdale	6504	6921	6709	6744	7759	13204	12784	12993	12951	13238
Loch Eck	-	2442	2442	2442	2442	-	3060	3060	3060	3059
Minard	2844	3225	3530	3689	3766	2345	1963	1638	1638	1561
Strathlachlan	3473	2409	2930	2968	2968	3843	5207	4686	4648	4647
Tighnabruaich	-	-	1039	1029	1829	-	-	132	145	633
Total	58853	56697	62012	64566	70774	90057	101162	98098	96749	98701
West Conservancy District	102660	106490	119542	133857	159819	124333	142751	142822	142713	162611

Figures for the West Conservancy District are shown for reference.

[a] Includes acquired woodland.

FIG. 77 MID-ARGYLL - PRIVATE WOODLANDS - 30th SEPTEMBER, 1960

Estate	Owner	Land Area Acres	Dedicated Woodland Area	Approved Woodland Area	Forest Land Outwith Schemes Area
Ardkinglas	John Noble, Esq.	35000	194	-	710
Ballimore	Captain J.D.G. Macrae	6000	487	-	13
Cumlodden	Islay Mark Campbell, Younger of Succoth	6000	499	-	210
Ederline	Major W. Warde-Alden	7000[a]	101	-	30
Glasvaar	Earl of Dundee	2600	325	-	-
Glenmore	Mrs Agnes P. Maclean	5000	47	-	-
Glenstriven	R.A. Constantine, Esq.	2000	-	425	-
Inveraray	Trustees of the 10th Duke of Argyll	35000[a]	2041	-	1203
Kenmore	Scottish Afforestation, per D.M. MacKinnan & Co., Oban	2544	2543	-	26
Knockdow	Peter H. Owen of Knockdow	5000[a]	252	-	93
Luss (part of)	Sir Ivar Colquhoun	6500[ab]	46	-	Not specified
Melfort	J.A. Billmeir, Esq.	3200[a]	90	-	235
Ballochyle	Economic Forestry Ltd.	9000	-	-	4305
		123844	6625	425	6825

[a] Estimated acreages

[b] Only that part of Luss within the parish of Arrochar. The rest of the estate lies outwith the region. On the whole estate there are 733 acres dedicated and 2070 acres of forest land outwith schemes.

B. STATE FORESTRY - A DESCRIPTION WITH PARTICULAR REFERENCE TO THE FORESTS OF KNAPDALE AND INVERLIEVER/EREDINE

Owing to the large number of forests in Mid-Argyll and to the fact that state afforestation both in applied method and in species planted does not greatly differ throughout the region, it was considered quite unnecessary to describe each forest individually. Instead, information is provided for two of the larger and older forests, namely, Knapdale and Inverliever/Eredine. By reading the text and studying the accompanying tables, the reader will come to appreciate some of the problems with which the Commission had to contend.

(1) Knapdale Forest

Knapdale is located south and west of the Crinan Canal. In May, 1930, the Achnamara Estate was sold to the Forestry Commission by the late Sir Ian Malcolm of Poltalloch. Altogether 20,792 acres were acquired. Of these, 1,992 acres were subsequently sold and a further 914 acres acquired near Tayvallich in 1941. More recently (1959), additional land was acquired at Oakfield in the north-east and at Ardnackaig in the west, giving a current total (1960) of 20997 acres. Land remaining to be planted (903 acres) incorporates 609 acres at Oakfield and 294 acres at Ardnackaig. Land use within the forest at 30th September, 1960, was as follows:

Forest Land	-	Acquired Plantations	1 acre
		Land planted by the Commission	6855 acres
		Land to be planted	903 acres
		Nurseries	- acres
			7759 acres
Other Land	-	Agricultural and other land use	13019* acres
		Forest Workers' Holdings	219 acres
			13238 acres

* About 1000 acres are scattered throughout the forest within the plantation fences. An estimated 300 acres of this is classed as poor plantable and a start has been made to afforest this area. The forest also contains about 550 acres of fresh water lochs.

Extending to more than 20,000 acres, Knapdale is one of the twenty-five largest forests in Britain. Nearly all of the forest lies in the parish of North Knapdale with the exception of about 2000 acres in the north-east in the neighbour-

:ing parish of South Knapdale. Nearly 70% of the former parish area lies within the forest and about 25% is already planted. The whole of the north of the parish has been transformed in the past 30 years from a pastoral area into almost one continuous block of conifers.

By reason of its topography, geology, climate, soils and remoteness, Knapdale is essentially a Highland forest. Indeed, the name is derived from the Gaelic, Cnapi-a-dhaill, meaning hills and valleys. Geologically, the area is composed primarily of Dalradian quartzites but both relief and soil conditions are influenced by the presence of numerous intrusive bands of epidiorite and horneblende schist, which give rise to the ridged topography so expressively described in the name. Most of the ridges which are aligned in a N.N.E.-S.S.W. direction, do not exceed 1000 ft. - those in the west and centre are lower, mainly below 500 ft. - but they form steep-sided hills which give an impression of greater relief. Overlooking the Crinan Canal, the ridges culminate in a steep bluff which drops along the line of a fault. Clay slates, low quality limestones and mica schists are of local significance.

Some 80% of the planted area is on peat, much of which was formerly fair qual-:ity moorland, mostly Molinia. In places, the peat is of a deep, fertile, granu-:lar texture which has proved advantageous to tree growth.

Because of its coastal position, snowfall is insignificant but winter gales may, on occasion, give rise to considerable wind blow. The relatively low relief allows trees to reach the crests of the hills and for the same reason, rainfall, about 50-60 inches per annum, is less than in most other forests in Mid-Argyll. The growing season which extends for about eight months (April to November) allows rapid growth, some species adding as much as 3 ft. to their height per annum. Late spring frosts[a] are less of a hazard in Knapdale than elsewhere, this being thought to be due to the absence of frost pockets.

When the Achnamara Estate was first acquired, some 1100 acres were under wood-:land, of which 562 acres was birch scrub of value for wintering sheep and cattle and the remainder mainly stands of conifers and hardwoods, notably at Daltote,

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[a] Page 55

Ashfield, Achnamara and Oib Mor. These woods dated from the 19th Century, for instance, on the Oib Mor peninsula at the head of Loch Sween, both conifers and hardwoods were planted between 1869 and 1873. Traces of the rich field layer which flourished beneath former woodland still exist. To-day, only 1 acre of the former coniferous plantations remains, while most of the former scrub, except on a few steep rocky slopes where oak scrub has survived, has been treated by felling or ringing and subsequent replanting. Some of the better specimens of the old hardwoods have been retained on amenity grounds and so serve to break the monotony of the green swards of the new coniferous plantations.[175] Those that were ringed so that they die standing provide the Commission with a cheap method of combining shelter with the removal of an overhead cover from a young under crop. While economically sound, such a policy can prove bad propaganda in the eyes of a critical public. Near Ashfield, a network of narrow strips of the original woodland may still be seen. These have been temporarily retained to provide shelter for young trees planted in the cleared areas.

It is interesting to record that in the absence of grazing, some of the un-:planted areas within the forest are being colonised by birch which, despite its low economic value, may be regarded as a soil improver, its long roots drawing minerals from deeper levels than do the shallow-rooted conifers, the minerals be-:ing returned to the surface layer with leaf fall. It may be that once improved, such land could eventually be planted with conifers. No doubt, this has encouraged the Commission to earmark some of the "wasted" land within the forest fence for future planting.

At time of acquisition the former proprietor was favourably inclined to affor-:estation but felt unable to undertake the planting himself, probably on account of the depression in land values currently in operation. State planting commenced in 1931 on the Oib Mor and Oib Greim peninsulas at the head of Loch Sween, and was followed by afforestation of the hills immediately to the east of the Bellanoch - Achnamara road and in the extreme west of the area. As aforesaid, planting is now virtually completed with the exception of Oakfield and Ardnackaig and of former

unplantable within the forest fence. The earlier plantings were carried through with seedlings raised locally but since the war, young trees have been imported from elsewhere in Mid-Argyll. The accompanying table shows the rate of planting on a five-yearly basis, over the past thirty years.

Planting Years	Acreage Planted
1931 - 35	1601
1936 - 40	1607
1941 - 45	801
1946 - 50	591
1951 - 55	2107
1956 - 60	197

As elsewhere, the species planted were closely determined by environmental factors including soil depth and acidity, drainage and exposure, the former vegeta-:tion cover often being indicative of the nature of a particular site. Peat being of common occurrence and often forming a hard pan so as to interfere with drainage, made necessary deep ploughing - the turf is turned right over and planted on top - and the thorough draining of many sites. Being one of the earlier forests, planting in Knapdale was in a sense experimental, the knowledge gained from the study of different species under different site conditions being of ines-:timable value to the Commission in the planning and planting of later forests. Largely as a result of thorough ground preparation in the beginning, few failures were suffered in Knapdale, but it was noted that whereas Scots Pine, European Larch and hardwoods, generally gave poor results, spruces showed great promise. In consequence, spruces form the bulk of the plantations.

Species Planted	Acreage
Sitka Spruce	3850
Norway Spruce	1950
Japanese Larch	400
European Larch	200
Pinus Contorta	200
Douglas Fir	100

Other conifers including Scots Pine, Tsuga (North American Hemlock) Corsican Pine and Austrian Pine, comprise a further 150 acres. There are also about 50 acres of hardwoods. The statistics refer to conditions pertaining at 30th September, 1960.

The wetter climate of Mid-Argyll favours the spruce.[a] This contrasts with Tummel and Beauly, where, under drier continental conditions, Scots Pine is the dominant species.

Primarily for geographical reasons but also on account of economic considera-:tions and labour problems, the forest is divided into 27 working blocks. The smaller blocks serve to equalise the fluctuating amounts of work in the larger blocks - this is a problem common to all forests - and to assist local management in the distribution and transport of labour. A block of 400 planted acres is con-:sidered an ideal working block. Each block is dealt with in rotation for drain-:ing, brashing, thinning and in the planning and construction of new roads. Forest control is exercised both through paper control of rotation work in the various blocks and by field inspection. The forest is staffed by a head forester, a senior forester and three assistant foresters.

Like many newly acquired areas Knapdale was poorly served by roads. Despite difficulties arising from the nature of the topography, 57 miles of roads (30 since 1951) had been built by 1960. At present about 5 miles of new road are being con-:structed annually. These roads not only provide access to forest workers' holdings, but, as in Glen Affric, allow the general public to have access to many parts of Knapdale formerly remote. Fishings on many hill lochs may also be reached by for-:est roads.

(2) Inverliever/Eredine Forest

Like Knapdale, Inverliever - the name is derived from the River Liever which

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[a] Spruce is the dominant species throughout the whole West Conservancy. Trees planted in the Conservancy in 1960 were classed as follows.

Species	Number of (Thousands)	Species	Number of (Thousands)
Scots Pine	637	Douglas Fir	104
Corsican Pine	76	Norway Spruce	1185
Contorta Pine	750	Sitka Spruce	4507
European Larch	91	Oak	20
Japanese Larch	374	Beech	32
Hybrid Larch	372	Sycamore	4
		Other Broad Leaved	17

Total 8897 (thousand)

flows into Loch Awe - was acquired as a sporting estate from the Poltalloch Estates. The original acquisition (12608 acres) was made in 1907 by H.M. Office of Woods - the Commission was not then in being - and extended along the west shore of Loch Awe between Ford and Dalavich. Subsequent acquisitions[a] included Eredine, on the opposite shore of the loch, Barnaline, north of Dalavich, and Maolachy, north and west of Loch Avich. The first named, on account of its size and location, is treated as a separate forest for management purposes. Land use within Inverliever/Eredine at 30th September, 1960, was as follows.

Forest Land -	Acquired Plantations	1751 acres
	Land planted by the Commission	5028 acres
	Land to be planted	541 acres
	Nurseries	3 acres
		7323 acres
Other Land -	Agricultural and other land use	21687 acres
	Forest Workers' Holdings	50 acres
		21737 acres

Inverliever/Eredine lies primarily within the parish of Kilchrenan and Dalavich but with overlaps into the neighbouring parishes of Kilmartin (Inverliever) and Kilmichael Glassary (Eredine). Generally, the land on either side of Loch Awe, but especially in the west, rises steeply to about the 750 ft. contour. Above this the topography is characterised by a series of low ridges and valleys (N.E.-S.W.), while above 900 - 1000 ft., there are considerable areas of gentler relief - remnants of the old plateau surface[b] which characterises the landscape at this elevation between Loch Etive and Loch Fyne, south of the Ben Cruachan massif. The economic tree-line currently extends to about the 900 ft.[c] contour, although it may in places be much lower depending on soil type and exposure.

Soils are primarily derived from epidiorite sills which occupy most of the area and consequently, tend to be rather heavy and stiff in texture and yellowish

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[a] Acquisition dates were:- Eredine (1934)
Barnaline (1953)
Maolachy (1960)

[b] Probably synonymous with Fleets' Grampian Lower Surface mentioned under the Tummel Basin.

[c] Contrast with heights indicated in Beauly and Tummel.

in colour. Except in hollows, they tend to be shallow, yet, despite the fact that above 500 ft. the area is largely peat - this is of a deep fibrous variety except in hollows where it is of an amorphous flush type - the slopes were initial-:ly well drained.

Below 500 ft, much of the vegetation at time of acquisition was mixed scrub-oak, ash, birch, alder, hazel and rowan - with Aira flexuosa and various species of Agrostis and Holcus, forming the main ground vegetation where land was open. Bracken was in process of invading much of the area. Above 500 ft., vegetation varied considerably from Molinia, heath and bog myrtle associations, to Scirpus, bog asphodel and Spaghnum mosses. Generally, where drainage was good, bracken and finer grasses prevailed and where poor, cotton grass and Erica tetralix were dominant varieties.

Wind was and remains a hazard to tree growth, the area having little shelter from the prevailing south-westerlies although Dun Corrach, 951 ft. O.D. (834 ft. above Loch Awe), on the west shore, provides shelter to plantations now established on its east side. Rainfall (about 80 inches) is considerably higher than in Kanp-:dale, the climate being characterised by a prevalence of cloudy conditions. As in most West Highland locations snow seldom lies long.

On the original acquisition of 12,608 acres, only 76 acres - mixed conifers of which only 7 remain to-day - were classed as acquired plantations. These were in four main blocks by the lochside and contained a mixture of Scots Pine, European Larch, Douglas Fir, Silver Fir, Norway Spruce and hardwoods, the last mentioned being primarily oak and birch. All were in a neglected state. The remaining land, with the exception of 197 acres of scrub, was bare. Initially it was con-:sidered that about three-quarters of the acquired land could be planted but poor results from the first plantings[a] - planting commenced in 1909 using seedlings from a nursery at Ford - led to a detailed land and vegetation survey of the whole area - this was initiated by the late Lord Robinson and conducted by a local forester -

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[a] Failures in earlier plantings were considered to be primarily due to:-
(i) Lack of adequate ground preparation before planting.
(ii) Deer damage through inadequate precaution.
(iii) Uses of species unsuited to site environment.

between the years 1914 and 1917. The results obtained showed that only 5000 acres (40%) was capable of carrying a tree crop. It was further agreed that existing farms[a] be retained as economic units and thus much of the potential plantable was directed to be retained under agriculture. Consequently, only 2979 acres, including 76 acres of acquired plantations, were scheduled for forestry.

The first plantations were established on the north-east section of Arichamish on the south side of the Cruachan Burn. The area resumed from Arichamish extended to 1100 acres and on this area, 800 acres were planted between 1909 and 1914. 968 acres were planted on 1305 acres resumed from Barnaddy and Cruachan between 1915 and 1923 and a further 466 acres were planted on Torran and Arichamish between 1924 and 1928. A further 70 acres were planted piecemeal within the closed area between 1923 and 1932 and 57 acres of acquired woodlands replanted. The following table shows the acreages planted between 1909 and 1932.

Planting Years	Acreage Planted
1909 - 13	598.5
1914 - 18	595.25
1919 - 23	568.5
1924 - 28	505.7
1929 - 32	70.25

The above acreages include the replanting of sites where earlier plantings had failed to become established. About 288 acres within the forest fence is at present classed as unplantable. Approximately a further 600 acres will not be resumed for planting until the retiral of the present tenants at Torran and Arichamish. Consequently, since 1932, no planting other than a little replanting has been done on the original Inverliever acquisition. Later plantings, both before and since the late war, have been on the Eredine and Barnaline acquisitions while most of the current plantable in hand is on the Maolachy acquisition.

Ground preparation is similar to elsewhere. During planting much scrub is left standing as a cover crop and then killed by ringing. On the later acquisitions, modern techniques in deep ploughing and fertiliser treatment have been used and results to date have been gratifying. Like Knapdale spruces form the bulk of the plantings. The success of spruce as a timber crop is shown by the fact that

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[a] Arichamish and Inverliever Lodge, Barmaddy and Cruachan, Salachary, Torran and FordPendicle. In 1960, Salachary (503 acres) was transferred to Kilmartin Forest.

Sitka Spruces planted at an elevation of 850 ft. in 1914 are now over 70 ft. high, while those at lower elevations have attained 100 ft. The following is indicative of the environmental control exercised over both planting and species.

Under 500 ft. O.D.

Norway Spruce - Planted on a wide variety of sites both sheltered and exposed.
Sitka Spruce - Similar to Norway Spruce but usually in more sheltered positions.
Scots Pine - Very little but planted on drier sites where heather dominant.
European Larch - Planted on sites where bracken dominant and where soils are rich in mineral content. Generally on lower slopes.
Japanese Larch - Similar to European Larch but on a wider variety of sites.
Douglas Fir - Planted mainly where soils deep and in areas which previously furnished good pasture.
Silver Fir - Similar to Douglas Fir but in more sheltered positions.
Beech - Planted to provide shelter for Silver Fir and as protective belts along roadsides.

Above 500 ft. O.D.

Norway Spruce - Widely planted but primarily on areas of mixed heather/grass.
Sitka Spruce - Again widely grown but in more sheltered positions, for example, along valley bottoms and where soils richer and deeper. In later plantings, Sitka has formed the bulk of the spruces planted.
Scots Pine - Formerly used on higher sites where heather dominant but now the planting of such sites is done mainly with Contorta Pine and/or spruces.
Contorta Pine - Grown on the poorest and most exposed sites and planted in pure stands or in admixture with spruces. It is of interest that this species has been used successfully for planting at 1,000 ft. in neighbouring Inverinan Forest.

One of the most interesting silvicultural lessons offered by Inverliever is the ability of Sitka Spruce to survive 40 or more years of check and then suddenly, seemingly as there is an amelioration in local environmental conditions, to burst into life and grow as rapidly as a newly planted area. This phenomenon may be observed in areas of inadequately drained peat where there was formerly an irregu-:lar patchwork of checked areas and strong growing stands, the latter mainly along burns where drainage was better. These checked areas are now rapidly filling up with fine growing stands of timber and while this rejuvenation is not yet fully understood, it is thought to be due to a combination of many factors, including increased mycorrhizol activity, better shelter and improved drainage spreading from the trees not in check, all part of a change for the better in local environ-:mental conditions. It is thus unwise to write off any Sitka Spruce until it is unmistakably dead. If this had been known earlier the Commission could have avoided the replanting of many sites.

Much work has also been done at Inverliever into the effects of wind on close stands of conifers. Factors contributing to wind damage were found to include; serious neglect in thinning, inadequate drainage, clear felling for road lines and the planting of shallow soils overlying rock.

In consequence of its being the oldest state forest, Inverliever has provided the Commission with an object lesson in silvicultural problems and management con-:trol which has proved invaluable to state forestry throughout the country. Since forestry is a long term project this experimental role is by no means concluded.

When first acquired Inverliever was poorly served by roads. Indeed, it was probably worse off than most for the only road along the entire length of Loch Awe followed the east shore, that is, via Eredine. Although a network of forest roads were constructed,[a] communications were still considered so poor in 1935 when the first thinnings were made, that it was decided to market the timber by water and to this end, a 35 ft. boat[b] powered by a 30 H.P. Kelvin engine was purchased and launched on the loch the following year. Timber was ferried from Kilmaha to Durran from whence it was transported by road. Later, log rafts were towed across the loch. By 1952, over 750,000 cu. ft. had been ferried by both methods.[c]

An estimated three-fifths of Inverliever had reached the thinning stage by 1952. This together with the new forest village established at Dalavich in the same year, made necessary the construction of a public road (17 miles), between Ford and Kilchrenan. The road was completed in 1959 at a cost of £235,000.[176]

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[a] At the end of Forest Year, 1956 (30th September), the Commission were wholly responsible for 192 miles of motorable roads in Mid-Argyll. For the West Conservancy the figure was 323 miles.

Forest	Road Mileage	Forest	Road Mileage
Ardgartan	19	Kilmartin	Nil
Asknish	8	Kilmichael North	6
Benmore	16	Kilmichael South	4
Corlarach	1	Kilmory	3
Glenbranter	32	Knapdale	27
Glendaruel	1	Loch Eck	10
Glenfinart	15	Minard	8
Inverinan	8	Strathlachlan	5
Inverliever	24	Tighnabruaich	3
Eredine	2		

[b] Known as the "Coileach Coille" which translated means the "Woodcock".
[c] Timber has also on occasion been ferried across Loch Eck in Cowal.

To drive along its fine but switchback surface[177] under tall straight conifers which seem to march with the sky is an exhilarating experience and one not readily forgotten.[a] As foreseen, the road has already proved of inestimable benefit for transporting timber quickly to the sawmills and processing plants at Cairnbaan and Strachur, while, not least, it provides a vital link between the scattered farms, holdings and communities of the area and elsewhere, notably the railhead at Taynuilt for Oban and Glasgow.

Forest control in Inverliever/Eredine is exercised rather similarly to that already described for Knapdale. As aforementioned, the two sides of the loch are managed as individual units each with its own staff and workers.

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[a] The new road may have increased the risk of fire danger but it also serves to provide better access should fire threaten.

C. AS A LAND USE

(i) ITS RELATION TO AND EFFECT ON AGRICULTURE

Recent decades have witnessed the steady encroachment of forestry on to land which by tradition had long been regarded the prerogative of the grazier and hill farmer. As inferred in Chapter 2C, few areas in the Highlands were more completely turned over to hill sheep in the 19th Century than was the county of Argyll, a con-:dition which, though in decline, continued into the present century. Consequently, in any appreciation of forestry as a form of land use in Mid-Argyll, one is ulti-:mately faced with the question as to whether it has been possible to reconcile the requirements of forestry with those of hill sheep farming.

In course of this study some difficulty was experienced in obtaining reliable agricultural information, particularly statistics at time of Commission acquisition. Again, it was considered both impracticable and unnecessary to make a detailed study of each forest area although nearly all were visited in the course of this investiga-:tion. As a result, work in the field and the compilation of statistical evidence (see accompanying tables) was directed at the longer established forests so as to provide the maximum period available during which any changes consequent on afores-:tation could be studied and noted. Inverliever was an obvious choice and since a good deal of factual information was also forthcoming for Knapdale, these two forests form the central theme of this study. Some reference is made to other forests where such is deemed necessary but in the main it was established that the findings made at Inverliever and Knapdale apply generally throughout Mid-Argyll. Notes are included on the hill farming research station at Lephinmore, Loch Fyneside.

In 1939, Frazer[53] drew attention to the value of sheep by stressing that the hill lamb was completely the product of its grazings in contrast to other livestock which were very much dependent on imported foodstuffs. One must also bear in mind that in the early decades of this century, indeed, until the outbreak of the Second

World War, hill farming (sheep) was a depressed industry.[a] Today, the situation is otherwise. Maximum home production is a cornerstone of official policy and thanks to encouragement given by Government loans, grants and subsidies, hill farming enjoys a prosperity probably greater than ever before. Further, by attrac-:ting capital, more attention is being given to good husbandry, which, in turn, lends stability.

The following are worth bearing in mind in relation to hill farming in Mid-Argyll.

(1) A Blackface wedder lamb was selling at under £1 in Oban market in 1930. In 1958, the price was £3. 10/- to £4.

(2) In 1930, wool fetched only a few pence per pound. In 1959, there was a guaranteed maximum price of 4/7¼d per lb.

(3) A hill sheep subsidy based on the number of ewes carried is paid in years considered unfavourable - due mainly to climatic conditions - to sheep farming. Hill cattle and calf rearing subsidies are also available, the former at the rate of £12 a head for breeding cows and in-calf heifers forming part of a regular breed-:ing herd kept all the year round on hill land, and the latter at the rate of £9. 5/- a head for steers and £7. 10/- a head for heifers (other than heifers of marked dairy type) and reared to the qualifying age of eight months. Where there is inadequate winter feed available on farms, which means that calves must be sold in the autumn, the qualifying age may be reduced to six months. This latter provision applies to most farms in Mid-Argyll where cattle are reared. The rates of subsidy pertain to those in operation in 1959/60.

(4) The cost of cultivating marginal land is largely financed by the Marginal Agricultural Production Scheme. Comprehensive grants are available under the Hill Farming and Livestock Rearing Acts for the rehabilitation of land and buildings.

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a Chapters 1 and 2C.

Various grants are also available for ploughing - mainly for bringing difficult land into a fit state for cropping - bracken control, drainage improvement and pest control.

(5) The Hill Farming Research Organisation have established an experimental research farm at Lephinmore on Loch Fyneside. Advice is available to hill farmers under the auspices of the West of Scotland College of Agriculture through officers located permanently in the county.

(6) Labour costs are now several times their pre-war level.

(7) Wintering costs have also risen substantially and are now second to labour in order of expenditure. Ewe hoggs now cost £1. 10/- to £2 per head for wintering away compared to 10/- pre-war.

Knapdale Forest

Altogether, 27 agricultural subjects - sheep farms, registered crofts and land holdings - with a total acreage of 19,798 and carrying 8,072 sheep, were wholly or partially acquired at the time of the original acquisition (1930).[a] Today there are 12 agricultural subjects - 8 farms, 2 registered crofts and 2 land holdings - and 10 forest workers' holdings within the forest area.[b] These are listed as follows.

Agricultural Subjects

(a) Farm Units[c,d]

1. Arichonan
2. Ashfield, Balure and Glebe
3. Daill, Craigglass and Barnagaad
4. Daltote
5. Dunrostan
6. Gallichoille
7. Gariob
8. Kilmahumaig

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a Fig. 78

b Forest holdings, unlike other agricultural subjects, do not come under the jurisdiction of the Department of Agriculture and Fisheries for Scotland. They may, however, benefit from the various agricultural grants and subsi-:dies listed on this and the previous page.

c The map in Fig. 85 shows their location.

d The past and present acreages of these units are given in Fig. 79.

With the exception of Nos. 1, 7, and 8, these are sheep farms. Ashfield, Balure and Glebe now form one unit being worked from Ashfield. Similarly Daill, Craigglass and Barnagaad are worked as one unit although the farmhouse at Barnagaad, together with about 21 acres of adjacent land, is now a forest holding and store. Daill and the remainder of Craigglass (part was acquired in 1930 - Fig. 78) were acquired as a subsequent acquisition to Knapdale Forest.

(b) Crofts and Holdings[a]

1. Blairintibberth
2. Bellanoch and North Leachnabaan
3. Kilmichael Inverlussa
4. Kilmahumaig

Nos. 1 and 2 are registered crofts and Nos. 3 and 4 land holdings. Care should be exercised not to confuse Kilmahumaig holding with Kilmahumaig farm, or the Kilmichael Inverlussa listed here with the forest holding of the same name in the next table. All 4 crofts and holdings are less than 50 acres in size.

Forest Workers' Holdings[a,b]

1. Ardnackaig
2. Arinafad
3. Barnagaad
4. Barnluasgan
5. Braeface
6. Craglans
7. Dunans
8. Kilmichael Inverlussa
9. Seafield
10. South Leachnabaan

Nearly all forest workers' holdings are ex-agricultural subjects.

Miscellaneous subjects within the forest area in addition to those already listed include, Eilean-da-Mheinn feu, Daltote Hill Lochs and Achnamara Shootings, all of which are tenanted. There are also 12 grazing lets within the forest all of which are rented on an eleven months basis. These lie outwith the scope of the Agricultural Acts. Altogether, there are approximately 80 inhabited houses within the forest area of which over 50 are inhabited by forest staff and workers.[c]

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a The map in Fig. 85 shows their location.

b The acreages of these units are given in Fig. 80.

c Fig. 88A.

As aforesaid, and noted in Fig. 78, some 8,000 sheep were grazed in the forest area prior to afforestation. Fig. 79 shows the number of sheep within the area today (1960) to be about 5200[a]. Sheep numbers have, therefore, decreased by between 2800 and 3000[b] over the period 1930-60. Since hill farming is now generally recognised to be more prosperous than in 1930, one may conclude that this decrease is largely as a direct result of state afforestation. From Fig. 80 it may be deduced that about 1600 sheep have been cleared from land now under forest workers' holdings alone. Nevertheless, despite these decreases, it would be wrong to suggest that nothing has been done to safeguard agricultural interests. On those farms which remain, despite a substantial reduction (33.5%) in their combined acreage between 1930 and 1960, the total number of sheep has only slightly declined (2.5%) over the same period.[c] This would suggest that in the initial direction of ground as to which areas should be planted and which should be retained under agriculture, some effort was made to protect local farming. On the other hand, a change in tenancy may account, at least in part, for the fluctuations in the economics of a particular farm. In Knapdale, five of the eight farms listed in Fig. 79 changed tenancy over the intervening period 1930-60. Three of these - Daltote, Dunrostan, and Gallichoille - show an increase in sheep numbers, a fourth - Gariob - no change and the remaining unit - Daill, Craigglass and Barnagaad - a decrease, therefore, on balance the changes in tenancy seem here to have had favourable consequences.

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a Very few if any sheep are kept today on agricultural crofts and holdings or on forest holdings, the breeding and rearing of cattle being considered a more profitable proposition.

b The actual figure compiled from Figs. 78 and 79 is 2869.

c Fig. 79.

Lastly, might not the various subsidies now available to hill farming have allowed agriculture to survive on a contracted acreage through making possible more intensive use[a] of the land remaining to farming? One might equally well argue that local agriculture may also have benefited through being stimulated to greater production by the competition for land created by the introduction of state forestry.

Again it may be noted that whereas sheep numbers have declined, cattle have increased despite an apparent reduction in local dairying.[b] This change is not considered to be related in any way to afforestation but rather is one which has been motivated by the hill cattle and calf rearing subsidies. A long term advantage of the decrease in the sheep/cattle ratio is that it should ultimately improve hill pasture by restricting the spread of roughage such as bracken and coarse grasses.

But while such may be noted with satisfaction, one cannot report that all is well from the agricultural viewpoint. Apart from the decrease in the number of agricultural subjects now partly replaced by forest holdings and the subsequent decline in sheep, some of the remaining units are quite uneconomic, at least in their former capacity. This may seem surprising considering the statement made previously that when ground was initially directed for forestry and agriculture, evidence suggested that care was taken to safeguard agricultural interests. But while the general conclusion must be that this was done, it does not mean that all farms benefited from the adoption and application of such a policy. For example, on both Arichonan and Kilmahumaig, sheep stocks have had to be entirely cleared, while on Daill, Craigglass and Barnagaad - the amalgamation of former units is another consequence of forestry - sheep numbers have been halved. This has promoted some ill-feeling among agriculturalists who consider that the Commission should not have

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a The sheep density on the eight units under study rose by about one third, that is, from 1 sheep to 2.6 acres to 1 sheep to 1.7 acres between 1930 and 1960.

b Figs. 82 and 83.

been allowed to plant so much land even although much of it may have been seriously understocked at time of acquisition. Along the east shore of Loch Sween there is evidence that some ground of wintering value has been afforested. Although the effect is not readily apparent, investigation did show that more wintering has now to be done away than formerly so adding to costs.[a] Ashfield provides a case for study. Here, only 35½ acres of a total of 3274½ acres are improved land, mainly under grass.[b] The land rises fairly steeply from the loch shore to 1500 ft. In 1960, 2323 sheep (1055 ewes) and 28 beef cattle were carried, consequently, wintering ground is at a premium. It seems, therefore, wrong that some 60 acres of low ground - locally defined as land below 4 - 500 ft. - should have been planted. The loss of this land is claimed by the tenant as being responsible for the current need to win-:ter away annually some 300 hoggs at Crieff. On the other hand, it could equally well be claimed by the Commission that since afforestation the numbers of sheep and cattle on Ashfield have increased, thus invalidating the argument forwarded by the tenant.

Might not the new plantations by providing shelter for stock when once estab-:lished, be of value to local agriculture? Again, there is controversy locally as to the ultimate benefit of forestry on this account. Agriculturalists argue that land now planted formerly provided scrub shelter and that since the topography provides much natural ground shelter, the plantations even when fully grown will be of little benefit to farming. However, from observations made elsewhere in Knapdale and in Mid-Argyll, the writer must conclude that such a view sadly underestimates the shelter value of trees. It is true that the physiography of Knapdale is such as to provide much ground shelter but to virtually reject the shelter value which plantations can give in a windy location such as Knapdale, is to show a general lack of appreciation of the subject.[c] Perhaps some of the blame rests with the Commission

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a See Page 443 as to present day wintering costs. The figures expressed are a good average for Mid-Argyll.

b Fig. 82.

c Fig. 21.

for although their plantations in Knapdale have a general shelter value, little effort seems to have been made to combine economic forestry with the provision of plantations giving maximum shelter and benefit to local agriculture.

Further south at Dunrostan and Daltote effects are rather similar to Ashfield, while at Arichonan, on the opposite side of the loch, forestry seems directly responsible for the current need to summer cattle elsewhere (in the south of the parish), as insufficient grazing - 24 acres - was left at time of planting to allow the subject to continue to function as an economic unit.

These considerations may seem small in the light of the larger issues involved, nevertheless, they are important to the individual tenant, While it may seem that some of the difficulties following to agriculturalists from afforestation have been exaggerated, there is, nonetheless, evidence that insufficient care was taken to ensure that the future of some individual holdings originally directed to be retained as agricultural units were inconvenienced as little as possible. Arichonan and Kilmahumaig are prominent in this respect. Now that hill farming is more pros-:perous it follows that many farmers wish they had their former larger acreages. This has promoted a certain amount of ill-will towards the Commission. One could argue in these more prosperous times that if the forest area had remained unplanted it would now be carrying 10,000 sheep, that is, if one allows for an increase similar to that which has occurred in the county as a whole.[a] If so, then the potential decrease through forestry may be reckoned at 4500 - 5000, instead of 2800 - 3000 as indicated. Further, one may assume that had the Commission acquired Knapdale in more recent times, then the current prosperity of hill farming may well have excluded forestry from large areas now planted. Yet whatever one may suppose, whatever one's views, it cannot be disputed that at the time the acquisition of land in Knapdale for afforestation was a positive step to bring back much derelict

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a Fig. 84.

land into production. Already nearly 7000 acres are under timber. The great object lesson to be learned from this survey is that production has been stimu-:lated[a] from land which previously, in relation to its potential, was producing little. It may have been with this in mind that Darling[36] was persuaded to write - "The physiography of the Knapdales makes them remote and unsuitable for farming for other than subsistence needs, but they are ideal for forestry."

Inverliever Forest

At time of first acquisition, in addition to four sheep farms, namely, Arichamish, Barmaddy, Salachary and Torran, crofts and land holdings existed at Cruachan, Ford Pendicle, Inverliever Lodge, New York and Dalavich. The crofts and holdings extended to 336 acres of which 146 were on Dalavich. Only New York (31 acres) and Dalavich (134 acres) - 12 acres were resumed for the construction of Dalavich forest village in 1952 - exist as separate agricultural subjects today, as most of the land of the other holdings and crofts, apart from that subsequently planted, is now part of neighbouring sheep farms[b] or of the six forest holdings[c] created by the Commission. The combined acreage of the forest holdings is 50, while information as to the acreages, land use and stock carried on the sheep farms, is given in Figs. 81 and 82. In this study we shall be concerned as in Knapdale with the effects of afforestation on the major farm units, that is, the sheep farms.

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a Current production (1960) of timber from Knapdale averages 110,000 cu.ft. per annum. It is planned to increase this by 20,000 cu. ft. per annum of each of the next five years.

b The land at Cruachan is now amalgamated with Barmaddy, Inverliever Lodge with Arichamish and Ford Pendicle with Torran. Kilmaha is now under forest holdings. Salachary farm was lately (1960) transferred to Kilmartin Forest.

c Referred to as Nursery, Nos. 1 and 2, Kilmaha, Nos. 3 and 6; Torran, Nos. 4 and 5.

As noted under Knapdale, care must always be exercised when comparing agricultural statistics that adequate allowance is made for changes in tenancy, for obviously different tenants will vary in their capacity for working the land of a particular subject. Fortunately, in Inverliever, the major farm units have not changed tenancy for many years, indeed, the farmer at Torran claims to be the oldest tenant of the Commission in Britain while at Arichamish, the claim is to the distinction of having the earliest state plantations in Scotland. Consequently, any changes on these farms must be as truly indicative as it is possible to ascer-:tain of the long term effects of state afforestation on agriculture.

Fig. 81 shows the acreages, sheep and cattle stocks, of the three major farm units both at time of acquisition (1907) and in 1960. 400 less sheep but 90 more cattle are now carried. Considering the extension of afforestation along Loch Aweside, this is no mean achievement. How has it been seemingly possible to reconcile the two interests? The following reasons are suggested.

(1) There is evidence that care has been taken to ensure that much low ground, although potentially first class forest land, was retained in agricultural use. About 1900 acres fall into this category. This is apparent from examination of the local O.S. One Inch Map,[a] particularly along the southwest shore of Loch Awe. At Barmaddy, where less low ground was retained under agriculture, sheep numbers have shown a greater decrease.

Further support for this suggestion comes to mind when one recalls that follow-:ing the land and vegetation survey initiated in 1914, care was exercised to safe-:guard existing farms as economic units by directing much potential forest land to be retained under farming use.[b] The results of this survey in relation to the

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a Fig. 24.

b Page 437.

major farm units are shown below.

Farm	Total Area (Acres)	Plantable Area (Acres)	Unplantable Area (Acres)
Arichamish and Inverliever Lodge	4962	2517	2445
Barmaddy and Cruachan	4067	1414	2656
Torran and Ford Pendicle	3076	1026	2050
Salachary[a]	503	254	249
	12608	5211	7397

Only 2979 acres of the above plantable were scheduled for forestry.

(2) As in Knapdale, a general improvement in the economics of hill farming consequent on agricultural subsidy and perhaps also motivated by the competition for land promoted by large scale afforestation, has made both necessary and practi-:cable a more intensive use of the remaining agricultural land. Wintering away continues as a disadvantage[b] but farmers can now better afford to do so despite increases in costs. This in turn allows a greater number of stock to be carried than formerly. The increase in the number of cattle is a step towards the crea-:tion of a more favourable balance between cattle and sheep to the ultimate benefit of local grazings.

(3) Inverliever was acquired as a "sporting estate." This suggests that much hill land was not utilised to the full for farming. Considering that sheep and cattle numbers have changed little since acquisition, this suggests that a rough balance has been maintained in agriculture between land lost to trees and that gained from deer.

While one may rightfully argue that forestry has retarded, if not prevented, the expansion in hill farming which has occurred elsewhere, one may equally well point out that through displacing a few of the sheep previously carried, the

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a Now transferred to Kilmartin Forest.

b For example, Arichamish winters at Tayvallich (Knapdale) and Torran at Elgin, Kilmartin and Benderloch. A little wintering is done at home on both farms.

Commission have been able to produce a fine crop of timber from hundreds of acres previously under-utilised. As the oldest state forest Inverliever came early into production and to date (1960), over 1 million cu. ft. of timber have been marketed. There is no doubt in the writer's mind that both the land now under trees and that remaining to agriculture is much more productive today than it was at time of acquisition. The current prosperity of local hill farming may also be gauged from the fact that both Arichamish and Torran have undergone substantial modernisation recently under the Hill Farming Improvement Scheme. At time of visitation (1960), Torran farmhouse and steading were being largely reconstructed. While the farm had had its own supply for electricity for thirty years, both it and others between Ford and Dalavich were being connected to the grid by the Hydro Board under a scheme in 1959/60 to bring electricity to this part of Mid-Argyll. These changes would suggest that despite afforestation there is a future for hill farming in Inverliever and perhaps more important, local people are aware of it. Finally, local agriculturalists were agreed that tree planting has been of benefit with respect to providing shelter to stock. Nevertheless, they considered that the shelter value of forestry, at least locally, was greatly overplayed for the following reasons.

(1) The topography was such as to provide considerable ground shelter to stock. This may be inferred from the description of the forest area given in the previous sub-section of this chapter.

(2) Most of the forest was planted in large blocks of little shelter value.

(3) Most wintering was done away hence the value of shelter was minimised.

(4) The greater part of the hill land lay above the tree line.

Eredine Forest

Eredine was acquired nearly thirty years after the main acquisition at Inverliever. Unfortunately, the writer was unable to obtain agricultural information for the forest area at time of acquisition. For these reasons it is not possible

to make a direct comparison between the two sides of Loch Awe. However, information was obtainable for 1938 - four years after acquisition.

The three major farm units, Ardchonnell, Braevallich and Portinnisherrich, have been retained as agricultural subjects. The first two are sheep farms while the last mentioned is considerably smaller (90 acres) and primarily concerned with hill cattle.

Since 1938, sheep numbers on Eredine have practically doubled, namely, from 2931 to 5847, while cattle have increased from 65 to 100.[a] Three reasons seem paramount.

(1) Both sheep farms have greatly increased in size, Braevallich being now 2½ times and Ardchonnell 5 times its former size. By contrast Portinnisherrich is as before.[b]

Farm	Acreage	
	1938	1960
Braevallich	3024	7770
Ardchonnell	759	3877
Portinnisherrich	90	90
	3873	11737

The increases in acreage on Braevallich and Ardchonnell were made possible mainly through the acquisition of a considerable acreage of rough previously reserved mainly for sporting use. By reason of its nature and elevation this was classed as unplantable by the Commission but was considered suitable for hill sheep. At Braevallich the arable acreage has been greatly increased (from 29½ to 170 acres) by the reclamation of former rough pasture. Most of this arable is under grass and has helped to make practicable the increases in cattle and sheep numbers as listed in Fig. 82.

(2) Braevallich changed tenancy between 1948 and 1951. The present tenant, who hails from Dumfriesshire, has greatly increased the stock carrying capacity of the farm. The increase in arable noted in the previous paragraph was initiated by him.

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a Fig. 82.

b Almost certainly related to the capacity of the present tenant.

(3) Ardchonnell has obviously benefited both from post-war agricultural subsidy and from an increase in acreage. By contrast the arable acreage, small as it was, has been halved,[a] Most wintering has still to be done away, a disadvantage further aggravated by the planting of some low ground formerly of wintering value. In consequence, less wintering is now done at home than previously.

Agricultural trends in Eredine are clearly expressed by study of the individual farm statistics given in Fig. 82. As in the other two forest areas studied, a noticeable trend has been the replacement of dairying by the rearing of beef cattle. A notable exception to this has been the retention of a small dairy herd - 8 cows - on Ardchonnell to supply milk to the nearby forest village of Eredine about three miles distant. The tenant contended he would have liked to have expanded this business but was prevented from doing so through lack of arable.[b]

One may conclude that forestry has interfered little with agriculture in Eredine despite the fact that approximately 2000 acres are now under plantations. The forest blocks, though large, are so sited as to be of no hindrance to the movement of stock to and from the hill, and provide a certain degree of shelter along their northern and eastern flanks from the prevailing south-westerly winds. One could rightly claim that through acquiring Eredine Estate the Commission have benefited local farmers by adding to the size of existing agricultural units.

The Commission have five small forest holdings at Durran near Braevallich. These are referred to as Braevallich Croft and Durran Holdings, Nos. 6-9.

Before concluding the studies made in Inverliever and Eredine, the reader is referred to the statistics for the parish of Kilchrenan and Dalavich[c]. The parish contains the greater part of Inverliever and Eredine Forests and the whole of Inverinan Forest. Three interesting points may be noted.

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a 17 acres in 1938 but only 9 acres in 1960.

b There are only 9 acres of improved land, 6 of which are under grass. Statistics refer to the year 1960.

c Fig. 83.

(1) Both the numbers of cattle and sheep are greater today (1960) than in 1925, that is, prior to the acquisition of Inverinan (1932) and Eredine (1934) by the Commission.

(2) In 1960, the number of cattle was greater than, and the number of sheep fast approaching, the 1912 figure, that is, the nearest available date to the acquisition of Inverliever (1907). The reader may recall that planting commenced in Inverliever in 1909.

(3) Both the trends noted in (1) and (2) in the parish are closely related to those for the County of Argyll, which may be deduced from the figures given in Fig. 84.

One must, therefore, conclude that despite afforestation it has been possible to maintain agricultural output in the parish roughly at the level pertaining prior to state afforestation. Since there is now less land available for farming despite the increases in farm acreages noted in Eredine, it is obvious that this can only have been made possible by increasing output on an areal basis from the land remain-:ing. Some may decry the fact that it has not been possible for agriculture to expand in view of the encroachment by trees. This may be true but what of the thousands of cubic feet of timber now being produced annually from all three forests, to say nothing of the employment given by such work! Surely the ultimate conclusion to be gauged from the information given for the forests and parish, is that the intro-:duction of forestry need not necessarily lead to a serious curtailment of existing farming but as on Loch Aweside, there can be a place for both to the resultant bene-:fit of the local economy.

Conclusion

Having recorded the facts, what conclusions may one draw from the welter of stati-:stics and other information - the latter largely compiled from discussion and obser-:vation in the field - embodied in the text of the preceding pages and the tables at the end of this sub-section? The following seem of paramount importance.

(1) Generally, the influence of forestry has been to reduce the number of agricul-:tural units, a process which, by reason of economics even without afforestation,

would have been inevitable, particularly in Knapdale. Economically, the small holdings which remain - 4 in Knapdale and 2 in Inverliever - are too small to justify much mechanisation, consequently, it is only through careful management and the expending of much labour that the land can be worked profitably. Normally they carry about a dozen beef cattle mainly for breeding, the calves providing a major source of income. Sheep are seldom kept although some provide wintering for neighbouring farms. Some ex-agricultural subjects are now forest holdings and there seems a distinct possibility that most, if not all, of the remaining small holdings will also eventually be transformed into forest holdings. At present there are 10 forest holdings in Knapdale, 6 in Inverliever and 5 in Eredine.

Before proceeding further it would be to advantage to consider briefly the forest holding and its value. Seafield in Knapdale is a typical holding. It lies close to the road about half a mile north of Achnamara village and extends to 25 acres inbye and 35 acres outrun. Being on the flat at the head of Loch Sween, the inbye, with the exception of 1 acre, is under meadow from which hay is cut in summer. Part of the hill is by the holding, the remainder being some $1\frac{1}{2}$ miles distant in a forest clearing southeast of Achnamara. This land was formerly part of the Balure grazings.

No sheep are at present kept and although other holdings may winter hoggs, this is not done at Seafield as the holder considers himself fully employed with what is in hand. 10 Shorthorn breeding cows are carried, the hill cattle and calf-rearing subsidies allowing a £30 profit on each calf sold. It is considered that eventually the breeding stock will be raised to 14 - the maximum the holding could carry - but doubts were expressed at to whether cattle would be kept in the future if the present subsidies were ever reduced. This last statement would serve to indicate the virtual dependence of such small units on outside assistance for survival.

It may be argued on economic grounds that Seafield would be better under trees than agriculture but this makes no allowance for the social value of the forest holder, nor of his value to the Commission as an employee. Neither does it take

into consideration the value of holdings in providing a vital link between agriculture and forestry. Through their holders the Commission may gain an appreciation of forestry from the agricultural viewpoint, so promoting further hope for closer understanding and integration between the two industries. It may be added that most holders are men of agricultural stock.

(2) From the evidence already quoted it cannot be denied that afforestation has been responsible for an overall decline in sheep numbers, that is, taking the three forests of Knapdale, Inverliever and Eredine together, an effect only partly mitigated by an increase in cattle. Some farms have increased their stocks but others, particularly in Knapdale, have been greatly hampered by tree planting, which would seem to account for the greater agricultural decline in this forest in comparison with Inverliever/Eredine. This trend is also expressed in parish statistics,[a] parish trends being closely allied to those of individual subjects within the respective parishes.

But while these are valid criticisms one is reminded that, in addition to farming, nearly 14,000 acres are under timber in the three forests, a change which could hardly have taken place without some effect on existing land uses. Consider-:ing the great acreage now under trees it may seem surprising that the effect has not been even more detrimental to farming. That this has not been so seems due to (a) agricultural subsidies which have allowed hill farmers to increase output from the land remaining at their disposal, and (b) the care exercised initially to safeguard agricultural interests (not in every case unfortunately) when land was earmarked for planting. This raises the difficult question as to whether agricul-:ture should always have first priority in the economics of Highland land use for, at present treads, it seems conceivable that forestry may ultimately replace agri-:culture as the basic land use in Mid-Argyll. Space restrictions preclude a detailed review of the respective merits of forestry and hill farming. Rather is

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a Fig. 83.

there need here to express that the ultimate aim must in general be the maximum return from all classes of hill land and by whatever means prove most suitable. This may raise certain difficulties in that it may temporarily precipitate a drift of people away from areas where agriculture is less economic, but such may be inevitable if we are ever to solve the Highland problem, which, as stated in a White Paper[245] in 1950, "..... is to encourage people to live in the Highlands by making it possible to secure there in return for reasonable effort proper standards of life and the means of paying for them." It would seem probable as happened in say, Inverliever, that some of the displaced agricultural population, to say nothing of new people brought into the area, would be absorbed by forestry. The present competition between the two industries may be beneficial in that each is stimulated to increase productivity, but it is undesirable in that since present policy is directed towards safeguarding agriculture, the Commission are finding it increasingly difficult to acquire enough land to fulfil their planting programme. This has been particularly true since the Forestry Act (1945) when the powers of the Forest Commis-:sioners to acquire land in Scotland were transferred to the Secretary of State, so further extending the security of the tenant farmer. In this way land has been retained under agriculture which economically would have been far better under trees so hindering the maximising of production from our hill lands. In Mid-Argyll this is probably less true than elsewhere since, owing to the early acquisition of many forests, notably Knapdale, Inverliever and in Cowal, the planting of large blocks of real forest value has been the rule rather than the exception.

Again, while agricultural subsidy has been the means of resuscitating Highland agriculture, it has also proved the means of retaining many uneconomic units in production. The retention of such units by subsidy is a wasteful application of resources which could be more effectively used either in the further improvement of more viable units or in forestry. The strength of rural society derives from a positive use of the land[a] and with growing affluence, a higher return from our hill

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a Page 17

land is not only desirable but necessary if even the present population is to be maintained, far less increased. In this respect forestry is a welcome addition for it has helped raise the low level of utilisation of the hills that preceded it. This was noted in all three forest areas. Therein lies its strength and value.

(3) Finally, in all three forests it was clear from field observation that forestry had reduced the wind hazard, at least on low ground. However, the views expressed on Page 448 suggest that more could have been done to establish more blocks of real shelter value to farming without greatly curtailing the monetary return from forestry. Again, study of the sizes and shapes of the blocks within the various plantations shows little evidence that the ultimate shelter value of forestry locally was ever considered. What shelter benefit has accrued from the plantations has been rather as a result of mere chance than of a concerted plan of action. Further considerations with regard to the shelter value of forestry to farming are related on Page 462.

In the Remainder of Mid-Argyll

What of the effects of large-scale afforestation on agriculture in the rest of Mid-Argyll? Fig. 84 would suggest that results have in general been similar to those already indicated. This was amply supported by field observation and study. In the earlier acquisitions, particularly in Cowal, agriculture has suffered both decline and difficulty in the face of forest encroachment. A common complaint among hill farmers is that forestry has restricted the movement of stock from the low ground to the hill grazings. This follows from the density of the forests, the large size of the blocks and the fact that the forests, on account of high relief, are concentrated on the lower slopes of the hills. Not enough care would seem to have been exercised in the provision of rides to safeguard the retention of the hill tops under agriculture.[178,179] Another complaint among graziers is that vermin control within plantations is not sufficiently exercised, so leading to increased losses among hill lambs. In consequence, relations between the Commission

and local agriculturalists are somewhat strained. Nevertheless, despite certain non-recoverable losses, the numbers of sheep and cattle[a] within the county districts which comprise Mid-Argyll, are greater today than prewar and this despite the fact that many of the less economic units are now planted, their better land and buildings often constituting forest holdings. Output from remaining agricultural subjects must, consequently, be considerably higher than previously. Notwithstanding, the thousands of acres now under timber, the indication is that a much greater return is now being obtained from the land. In economic terms, particularly when one considers that Mid-Argyll is a region of relatively few natural resources, the resul-:tant benefit to the community at large must be regarded as significant.

Private Forestry

On private estates some of which have a long experience of forestry, for example, Cumlodden and Inveraray, there are numerous instances of forestry having been successfully combined with agriculture. Plantations have in many cases been sited with the dual purpose of combining shelter with the production of a final timber crop of real value. The private estate owner has a very important advan-:tage over the Forest Commissioners, namely, in that he is concerned with both agricultural and timber production, consequently, estate management is directed

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a If the prewar (1938) figures for cattle and sheep (Fig. 84) are expressed as 100, those for 1960 are as follows.

		Cattle	Sheep
Cowal	*	178.7	115.4
Mid Argyll (part of)	*	143.5	99.4
South Lorn (part of)	*	178.5	97.2
Region of Mid-Argyll		163.8	107.2
County of Argyll		136.7	124.6
Scotland		152.2	105.5

*See Fig. 84.

towards attaining the maximum return from both. Good grazing land is, therefore, seldom planted unless this is considered necessary in order to make certain blocks commercially attractive from the timber point of view. If such a policy is adopted then plantations can be so shaped as to provide the maximum shelter to the surrounding grazings so compensating for any loss in acreage.

An added advantage of the private estate is that where pure shelter belting has been resorted to, a shelter belt is unlikely to be cut unless there is another less mature belt nearby to take its place. As a result shelter for stock in the locality will be maintained. This seldom applies in state forestry where, since the only real interest is in timber production, whole plantations may be felled without any provision being made to provide alternative shelter for stock on adjacent agricultural land. One does not wish to detract from the fine job the Commission has done in the realms of productive forestry or from the fact that many areas are eminently more suitable for the growing of trees than farming but where land is richer, there is surely a case for the much wider development of what may be termed farm forestry, which, on much of our hill land, would seem the best means by which the two industries could be more closely integrated to their mutual benefit and to the benefit of the local economy. Perhaps there is a case here for rethinking how our hill lands may best be utilised in the light of both timber and food production.[a]

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a Although a farmer who owns land can make his choice as to which land should be planted, the siting of the shelter belts will be a matter for agreement with the Department of Agriculture where the work is to be assisted under the Hill Farming and Livestock Rearing Acts or the Agricultural Act, 1957. When the farmer is merely a tenant, the initiative would normally be expected to come from the owner. However, there is no reason why tenants should not suggest the planting of shelter belts on their farms and advise as to where best they may be sited. In addition, the long experience of the local shepherd may be invaluable in reaching a decision as to the siting of shelter belts or blocks. Further advice may also be obtained from the Commission who may also be willing to lend equipment to assist in ploughing, drainage, fencing, etc.

Lephinmore Research Farm

At present, the Hill Farming Research Organisation on their experimental farm at Lephinmore, Loch Fyneside (Strathlachlan Forest), are conducting as part of their programme, research into the effects of block planting and shelter on hill farming. Records are being kept of sheep performance on a hirsel on which all the low ground has been planted - this was done before the Organisation acquired the farm - and one where conditions pertain more or less as before. The effect of liming and reseeding so as to increase productivity is also being studied. As yet it is still too early to comment on the effects of afforestation other than:-

(1) Too much of the original oak and birch scrub was allocated to forestry so increasing wintering difficulties and costs.

(2) The farm presently carries 560 ewes and 160 ewe hoggs compared to 950 ewes and 290 ewe hoggs prior to afforestation. A further reduction is contemplated.

The farm extends to 33 acres arable, 30 acres enclosed pasture unsuited to cultivation and 4,000 acres of hill. 1,200 acres of the hill have already been planted in two blocks. These were fenced off in 1950-51. A further 300 acres are earmarked for afforestation but the Commission has agreed to defer this planting meantime. The land extends from sea level to 1,540 ft. and the planted area to 750-900 ft.

Experience at Lephinmore would seem to suggest that not enough has, or is yet being done, to combine economic timber production with the establishment of planta-:tions of real shelter value to agriculture. It is contended that trees may provide good shelter even where the percentage of woodland ranges as low as 0.3% to 2% of the total area. This would indicate that the shelter of woodlands is largely independent of the area of land planted. Of course, economic forestry demands the establishment of blocks of sufficient size as to justify expenditure on fencing, etc. A solution to this latter problem may perhaps be found if, wherever practi-:cable, blocks were sited closeby where sheep naturally tend to gather in time of storm. In this way maximum shelter value would be obtained.

FIG. 78 KNAPDALE FOREST - AGRICULTURAL SUBJECTS ACQUIRED

AT DATE OF ORIGINAL ACQUISITION (1930)

Subject	Acreage	Number of Sheep
Arichonan	664	480
Ashfield	2397	800
Balure	1968	470
Barnadaive	52	-
Braeface	44	-
Barnagaad	2000	900
Barnluasgan	130	40
Bellanoch and North Leachnabaan	310	80
Blairintibberth	239	80
Carsaig	997	530
Castle Sween	897	400
Craigglass (part of)	1781	850
Craigvaddie	1275	500
Daltote	1102	400
Dounie	552	350
Drimnacraig	27	-
Dunans	980	500
Dunrostan	1380	350
Gallichoille	590	400
Gariob	634	-
Gartnagronach	163	40
Island Mhor	85	-
Kilmahumaig	886	694
Kilmichael Inverlussa	175	-
Leachive	47	-
Seafield	391	128
South Leachnabaan	112	60
Total	19798	8072

FIG. 79 KNAPDALE FOREST - SOME AGRICULTURAL COMPARISONS, 1930 AND 1960

	1930		1960		
Subject	Acreage	Sheep	Acreage	Sheep	Cattle
Arichonan	664	480	50	-	33
Ashfield, Balure & Glebe	4365	1270	3274½	2323	28
Daill, Craigglass & Barnagaad	3781	1750	2955	961	19
Daltote	1102	400	1032½	692	33
Dunrostan	1380	350	763	619	32
Gallichoille	590	400	587	608	41
Gariob	634	-	49½	-	18
Kilmahumaig	886	694	201	-	29
	13402	5344	8912½	5203	235

No figures were obtainable for cattle in 1930, but individual farm statistics (Fig. 82) suggest there has been a steady increase in the numbers of cattle since 1930. The rearing of cattle for beef has largely replaced the former dairying.

It is interesting to note that while the combined acreage of the farms declined by 33.5%, sheep numbers have only decreased by 2.5%.

The following acreages were acquired for planting:- Ashfield, Balure and Blebe - 513; Daill and Craigglass - 1214; Daltote - 311; Dunrostan - 157; Kilmahumaig - 608. Boundaries and consequently acreages underwent change as result of decisions reached as to the direction of ground between forestry and agriculture, hence it is wrong to try and relate forested areas with changes in farm acreages between 1930 and 1960. No figures were readily procurable for Arichonan, Gallichoille, Gariob or that part of Barnagaad now worked from Craigglass.

FIG. 80 KNAPDALE FOREST - FOREST WORKERS' HOLDINGS, 30th SEPTEMBER, 1960

Holding	Former Acreage	Present Acreage[b]	Former Sheep Stock[c]
Ardnackaig	-	49	-
Arinafad	-	22	-
Barnagaad	2000[a]	21	900
Barnaluasgan	130	15½	40
Braeface	44	10	-
Craglans	-	22½	-
Dunans	980	27	500
Kilmichael Inverlussa	-	17	-
Seafield	391	25	128
South Leachnabaan	112	10	60
	1857	219	1628

[a] Allowance should be made for an unspecified acreage now worked from Craigglass (See page 444).

[b] Some holdings rent additional grazings which are not included here. For example, Seafield has the additional use of 35 acres of rough within the forest.

[c] Few or no sheep are grazed today, although some holdings may winter sheep. (See page 456).

FIG. 81 INVERLIEVER FOREST - SOME AGRICULTURAL COMPARISONS, 1907 AND 1960.

Subject	1907			1960		
	Acreage	Sheep	Cattle	Acreage	Sheep	Cattle
Arichamish and Inverliever Lodge	4962	2700	-	4250	2596	37
Barmaddy and Cruachan	4067	1750	-	3746½	1374	15
Torran and Ford Pendicle	3076	1900	30	2947	1970	69
	12105	6350	30	10943½	5940	121

Salachary, now in Kilmartin Forest, carried 300 sheep at date of acquisition.

While the combined average of the farms declined by 9.6%, sheep numbers have only decreased by 6.5% (cf. Knapdale). Note, however, that cattle increased by 300%.

FIG. 82 KNAPDALE, INVERLIEVER AND EREDINE FORESTS - AGRICULTURAL STATISTICS OF FARM UNITS, 1938, 1948, 1951, 1954, 1957 AND 1960.

These statistics were provided by courtesy of the Department of Agriculture and Fisheries for Scotland. No statistics are now available for years prior to 1938. Permission had first to be obtained from the farmers concerned, consequently, since some farms had changed tenancy over the period, statistics are incomplete.

In the tables the term "grass" includes both permanent and rotation grass.

KNAPDAIE - (1)

	Arichonan						Ashfield, Balure and Glebe						Daill, Craigglass and Barnagaad		
	1938	1948	1951	1954	1957	1960	1938	1948	1951	1954	1957	1960	1954	1957	1960
Land Utilisation (Acres)															
Oats	-	5½	4½	4	3½	4	1	4	2¼	1	4¾	2	3½	2¼	2¼
Potatoes	1	2	1½	1	1	1	¾	1½	1	½	1	¾	1¼	¾	¾
Turnips and Swedes	-	1	½	1	1	1	-	¾	-	-	¼	¼	½	½	-
Other Crops	-	-	-	-	-	-	-	-	-	-	-	1	½	3	½
Grass	49	17½	19½	20	20½	20	16¼	23¾	26¼	28	29½	31½	40¼	39½	42½
Total Improved Land	50	26	26	26	26	26	18	29½	29½	29½	35½	35½	46	46	46
Rough Grazing	500	24	24	24	24	24	2400	3300	3300	3233	3239	3239	2909	2909	2909
Total Agricultural Land	550	50	50	50	50	50	2418	3329½	3329½	3262½	3274½	3274½	2955	2955	2955
Livestock and Labour (Number of)															
Cattle - Dairy	35	-	-	-	-	-	8	23	19	-	-	-	10	3	1
Beef	-	28	39	20	20	33	10	2	5	15	27	28	3	16	18
Total	35	28	39	20	20	33	18	25	24	15	27	28	13	19	19
Sheep - Ewes	270	-	-	-	-	-	591	838	850	825	1020	1055	480	490	490
Total	600	-	-	-	-	-	1326	1965	2011	1917	2305	2323	933	965	961
Labour - Full time	-	-	-	-	-	-	2	1	1	4	2	2	1	1	1
Part-time	-	-	-	-	-	-	-	2[a]	2[a]	-	-	-	-	-	-
Total	-	-	-	-	-	-	2	3	3	4	2	2	1	1	1

[a] Casual labour

KNAPDALE - (2)

	Daltote					Dunrostan					Gallichoille	
	1948	1951	1954	1957	1960	1948	1951	1954	1957	1960	1957	1960
Land Utilisation (Acres)												
Oats	2½	5	-	1	-	3½	3	4½	4	3	1¾	4
Potatoes	2½	1½	1	-	-	1	1½	1½	1	¾	¼	½
Turnips and Swedes	-	1½	-	-	-	-	1½	1	1¼	¼	¼	-
Other Crops	4½	-	6	3	-	-	¼	¾	-	¼	-	½
Grass	23	24½	25½	28½	32½	19½	6¾	5¼	5¾	8¾	29¾	27
Total Improved Land	32½	32½	32½	32½	32½	24	13	13	13	13	32	32
Rough Grazing	1000	1000	1000	1000	1000	950	750	750	750	750	555	555
Total Agricultural Land	1032½	1032½	1032½	1032½	1032½	974	763	763	763	763	587	587
Livestock and Labour (Number of)												
Cattle - Dairy	-	-	-	-	-	16	11	3	-	-	6	-
Beef	11	31	38	25	33	2	16	23	34	32	22	41
Total	11	31	38	25	33	18	27	26	24	32	28	41
Sheep - Ewes	360	380	335	330	343	280	340	280	320	307	260	300
Total	739	726	641	686	692	608	697	551	674	619	557	608
Labour - Full time	-	1	1	-	-	-	1	1	1	1	1[a]	1
Part-time	-	-	2[a]	-	-	-	-	-	-	-	1[a]	-
Total	-	-	3	-	-	-	1	1	1	1	2	1

[a] Casual labour

	Gariob		Kilmahumaig					
	1957	1960	1938	1948	1951	1954	1957	1960
Land Utilisation (Acres)								
Oats	4	-	1¾	3	3	3	3	3½
Potatoes	½	-	1	1	1½	1	1	¾
Turnips and Swedes	1½	1	-	½	1	¾	1½	1¼
Other Crops	½	-	1¾	-	-	-	-	-
Grass	23	29	14½	7½	6½	7¼	6½	6½
Total Improved Land	30	30	19	12	12	12	12	12
Rough Grazing	20	19½	800	189	189	189	189	189
Total Agricultural Land	50	49½	819	201	201	201	201	201
Livestock and Labour (Number of)								
Cattle - Dairy	7	7	13	1	1	-	-	-
Beef	-	11	-	22	26	28	22	29
Total	7	18	13	23	27	28	22	29
Sheep - Ewes	-	-	315	-	-	-	-	-
Total	-	-	648	-	-	-	-	-
Labour - Full time	-	-	3	1	2	3	3	1
Part-time	-	-	-	-	-	-	-	-
Total	-	-	3	1	2	3	3	1

INVERLIEVER

	Arichamish						Barmaddy						Torran					
	1938	1948	1951	1954	1957	1960	1938	1948	1951	1954	1957	1960	1938	1948	1951	1954	1957	1960
Utilisation (Acres)																		
s	¾	1½	½	1	1¾	½	1	1	-	-	-	-	9	10½	9½	11	8	10
toes	¾	1¼	1	1	¾	½	-	1	1	½	1	1	1	2½	1½	1½	1½	1
ips and vedes	-	-	-	-	-	-	-	-	-	-	-	-	3½	2	2½	2	1½	2
er Crops	-	-	-	-	-	2	-	-	1	1	-	-	-	-	4½	-	-	-
ss	23½	23½	23½	23	23	22	16½	7	7	7½	8	8	33½	32½	29	32½	36	34
l Improved land	25	25	25	25	25	25	17½	9	9	9	9	9	47	47	47	47	47	47
gh Grazing[a]	4225	4225	4225	4225	4225	4225	3017	3025½	3737½	3737½	3737½	3737½	2900	2900	2900	2900	2900	2900
l Agricural Land	4250	4250	4250	4250	4250	4250	3034½	3034½	3746½	3746½	3746½	3746½	2947	2947	2947	2947	2947	2947
estock and abour (Number of)																		
tle - Dairy	11	11	-	-	-	-	3	7	10	10	-	-	9	-	2	-	-	-
Beef	14	25	31	33	33	37	-	7	2	6	16	15	46	82	71	76	75	69
Total	25	36	31	33	33	37	3	14	12	16	16	15	55	82	73	76	75	69
ep - Ewes	1115	1084	1075	1088	1128	1212	457	482	750	700	838	800	900	870	960	900	815	850
Total	2442	2400	2370	2440	2710	2596	947	849	1118	1226	1794	1374	2030	1917	1805	1800	2011	1970
our - Full Time	3	2	3	3	3	3	-	-	1	1	2	1	-	3	3	3	3	3
Part-Time	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	3	2	3	3	3	3	-	-	1	1	2	1	-	3	3	3	3	3

Under the Hill Farming Improvement Scheme for Arichamish, the acreage of rough grazing was listed as only 3441 acres, a difference of nearly 800 acres from that expressed in the agricultural returns. From the writer's experience (see also Fig. 83) care should be exercised when comparing agricultural statistics wherever acreages of rough grazing are involved.

EREDINE

	Ardchonnell						Braevallich						Portinnisherrich					
	1938	1948	1951	1954	1957	1960	1938	1948	1951	1954	1957	1960	1938	1948	1951	1954	1957	1960
nd Utilisation (Acres)																		
ts	-	3	2½	2	2	1½	4¼	5¼	6	6	8	4	-	2	1½		-	-
tatoes	-	½	1	¾	¾	½	¾	1½	1	¾	½	½	4½	1	½		½	1
rnips and Swedes	-	½	¼	½	½	1	1¼	2½	3	2¼	1½	1	-	-	-		-	-
her Crops	-	-	-				½	-	-	-	-	-	-	-	-		-	-
ass	17	5	5¼	5¾	5¾	6	17¼	20¼	160	161	160	164½	-	1½	2½		4	3½
tal Improved land	17	9	9	9	9	9	24	29½	170	170	170	170	4½	4½	4½		4½	4½
ugh Grazing	742	3868	3868	3868	3868	3868	3000	3000	7600	7600	7600	7600	85½	85½	85½		85½	85½
tal Agri-cultural land	759	3877	3877	3877	3877	3877	3024	3029½	7770	7770	7770	7770	90	90	90		90	90
vestock and bour (Number of)																		
ttle - Dairy	-	14	7	11	14	8	30	11	11	8	6	4	18	11	3		-	-
Beef	15	24	22	12	2	20	2	33	32	5	42	50	-	10	2		18	18
Total	15	38	29	23	16	28	32	44	43	13	48	54	18	21	5		18	18
eep - Ewes	250	660	827	920	1087	1271	1230	1296	1200	1420	1600	1812	2	-	13		-	-
Total	479	1553	1659	1352	2326	2469	2448	2572	2065	2798	3265	3378	4	-	36		-	-
bour - Full-Time	-	4	5	5	5	5	3	5	2	2	2	3	-	1	-		-	-
Part-Time	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-
Total	-	4	5	5	5	5	3	5	2	2	2	3	-	1	-		-	-

No Return Received

FIG. 83 PARISHES OF NORTH KNAPDALE AND KILCHRENAN AND DALAVICH - AGRICULTURAL STATISTICS, 1912, 1925, 1938, 1948, 1954 AND 1960.

	Year	Improved Land Acres Crops and Grass	Rough Grazing Acres	Total Agricultural Land Acres	Dairy Cattle	Beef Cattle	Total Cattle	Breeding Ewes	Total Sheep	Labour
	1912	1648	21876	23524	-	-	1674	5386	12278	-
	1925	1848	21299	23147	-	-	1423	4301	8735	86
	1938	1380	17971	19351	492	430	922	4349	9378	64
RTH KNAPDALE	1948	1222	16518	17740	333	865	1198	3374	7299	45
	1954	1142	16530	17672	149	968	1117	2993	6250	37
	1960	1092	14369	15461	61	1306	1367	3441	7297	20
	1912	790	32438	33228	-	-	503	8332	18485	-
	1925	905	36001	36906	-	-	585	8269	16454	38
LCHRENAN AND	1938	585	31761	32346	226	291	517	6914	14185	30
DALAVICH	1948	569	39248	39817	189	537	726	7652	15443	34
	1954	678	39570	40248	103	464	567	7662	14250	28
	1960	582	34376	34958	52	573	625	5045	17455	28

The rough grazing acreages listed for Kilchrenan and Dalavich are obviously incorrect. This is a common fault in Highland returns.

FIG. 84 MID-ARGYLL - AGRICULTURAL STATISTICS, 1912, 1925, 1938, 1948, 1954 AND 1960.

Year	District	Improved Land Acres: Crops and Grass	Dairy Cattle	Beef Cattle	Total Cattle	Breeding Ewes	Total Sheep	Workers: Males	Workers: Females	Workers: Total
1912	Cowal*	10337	-	-	5850	80828	176508	-	-	-
	Mid Argyll (part)*	12482	-	-	6552	37388	84492	-	-	-
	South Lorn (part)*	3056	-	-	2236	23608	59203	-	-	-
	Total	25875	-	-	14638	141824	320203	-	-	-
	Argyll	130813	-	-	58897	375703	840489	-	-	-
	Scotland	4291334	-	-	1184376	2971489	7004367	-	-	-
1925	Cowal	12164	-	-	4303	71969	145868	-	-	454
	Mid Argyll (part)	11865	-	-	5673	34052	70838	-	-	367
	South Lorn (part)	3846	-	-	2284	21604	43370	-	-	168
	Total	27875	-	-	12260	127625	260076	-	-	989
	Argyll	125081	-	-	52976	331477	746098	-	-	4199
	Scotland	4705197	-	-	1204791	3055887	7118820	-	-	122062
1938	Cowal	10653	2714	1118	3832	59490	122516	-	-	341
	Mid Argyll (part)	10663	2188	2061	4249	35725	76935	-	-	288
	South Lorn (part)	3711	793	1037	1830	19709	40477	-	-	153
	Total	25027	5695	4216	9911	114924	239928	-	-	782
	Argyll	110334	-	-	47340	325272	669126	-	-	3338
	Scotland	4560380	-	-	1315731	3383696	7969482	-	-	104340
1948	Cowal	10381	3141	2131	5272	59013	117297	-	-	333
	Mid Argyll (part)	9886	2352	3109	5461	33795	70443	-	-	286
	South Lorn (part)	2862	933	1912	2845	21279	43508	-	-	152
	Total	23129	6426	7152	13578	114087	231248	-	-	771
	Argyll	101557	-	-	61652	329127	669023	-	-	3628
	Scotland	4416752	-	-	1499243	2975401	6730664	-	-	117004

1954	Cowal*	9758	2362	3394	5756	50287	123027	243	52	295
	Mid Argyll (part)*	9688	1445	4067	5512	30858	64784	203	46	249
	South Lorn (part)*	2964	501	2232	2733	20991	39683	100	19	119
	Total	22410	4308	9693	14001	102136	227494	546	117	663
	Argyll	99224	26974	37758	64732	343288	706645	2329	558	2887
	Scotland	4388436	805801	903890	1709691	3119843	7429375	78177	19183	97360
1960	Cowal	9764	1555	5294	6849	67928	141384	211	31	242
	Mid Argyll (part)	9023	434	5663	6097	36966	76517	163	22	185
	South Lorn (part)	2828	291	2972	3263	20419	39337	93	18	111
	Total	21615	2280	13929	16209	125313	257238	467	71	538
	Argyll	96787	21652	53387	75039	406163	833743	2037	398	2435
	Scotland	4330138	761006	1241818	2002824	3561183	8407026	67925	14701	82626

* These refer to County districts.

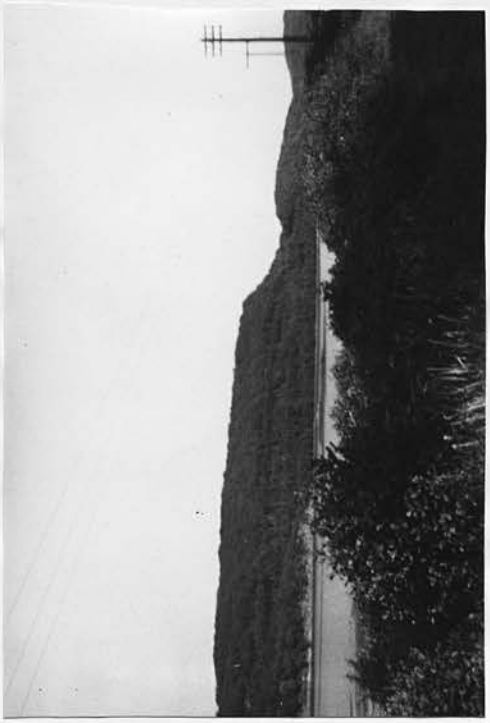
Cowal - Parishes of Dunoon and Kilmun, Inverchaolain, Kilfinan, Kilmodan, Lochgoilhead and Kilmorich, Strachur, Strathlachlan.

Mid Argyll (part) - Parishes of Craignish, Inverary, Kilmartin, Kilmichael Glassary, North Knapdale.

South Lorn (part) - Parishes of Kilbrandon and Kilchattan, Kilchrenan and Dalavich, Kilninver and Kilmelford.

Arrochar parish (Dunbartonshire) is included here under Cowal.

FIG.85 MID-ARGYLL - LAND USE WITHIN A STATE FOREST (KNAPDALE FOREST)



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174. Plantations reaching to the Hill Crests, Knapdale Forest.

175. Amenity Planting by Roadside, near Daltote, Knapdale Forest.

176-177. New Road by the West shore of Loch Awe, through Inverliever Forest. This road, 17 miles long (completed 1959), was constructed at a cost of nearly a quarter of a million pounds. It provides access between the communities of Ford, Dalavich, Inverinan and Kilchrenan, and has greatly facilitated the transport of timber from Inverliever and Inverinan forests.

178. Sterilisation of Upland Pasture by State Afforestation (Glenbranter Forest), Beinn Lagan (1526 ft.), near Strachur. The lack of adequate rides to permit ease of access for stock to and from upland pastures is a criticism of State Afforestation in some parts of Mid-Argyll.

179. Lower Hill Grazings backed by Hill Plantations (Glenbranter Forest), Balliemore, near Strachur. Access to the hill (Meall Reamhar) is provided by a ride through the forest (Fig. 24C, ref. 0998). This ride is also shown in Phot. 198.

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(ii) ITS RELATION TO AND EFFECT ON RIVER FLOWS WITH PARTICULAR REFERENCE TO HYDRO ELECTRICITY

With respect to hydro-electric generation, forestry is considered to be of little consequence in Mid-Argyll, most of the Board's schemes, with the exception of Glashan, being located in areas outwith afforestation schemes. This is a notable contrast to conditions pertaining in Beauly and Tummel where the areas of study were synonymous with river catchments. The raising of the level of Loch Glashan required the removal of some woodland but it may be noted that when planting Asknish Forest, the Commission, being aware of the Board's proposed scheme, made certain allowances for a rise in the water level by not planting to the original loch shore. The Board do not consider that the plantations will have any appreciable effect on the catchment of the scheme.

Support for this argument may be judged from the fact that the River Add - one of the main sources of water supply under the hydro-electric scheme - had not experienced any noticeable diminution in flooding as a result of the Commission's plantations in Kilmichael, Asknish and Minard forests. This would seem to suggest that the value of the control exercised by afforestation with regard to run-off and subsequently on river flows is greatly overrated. However, the writer is inclined to believe that to date - most of the plantations are post war - the interception of precipitation by the forest cover has only so far been sufficient to maintain a balance with the increased run-off which followed the deep ploughing and drainage schemes initiated at time of ground preparation for planting. Obviously, as many of these drainage ditches and channels become overgrown with ground vegetation and the trees mature, greater control will be exercised on run-off in both the basin of the Add and the now enlarged catchment of Loch Glashan. It ought to be appreciated, however, that parts of the Add basin lie in open country and thus the overall effect of the Commission's plantations on river flows may be considerably modified.

For similar reasons, despite the thousands of acres now planted on both sides of Loch Awe, woodlands are not considered to have any appreciable effect on run-off

from the catchment of the loch which is the main reservoir for the Board's Awe Scheme. It should be appreciated that a considerable proportion of the volume of water entering the loch originates from the Rivers Strae, Orchy and Lochy, which enter the northern end of the loch after flowing through country which is essentially non-wooded in character.

CHAPTER 17

HYDRO-ELECTRICITY AND FORESTRY THEIR SOCIAL IMPLICATIONS

An inevitable concomitant of any large undertaking is the provision of permanent dwellings to house employees and dependents. In this respect the various schemes carried through by the North of Scotland Hydro-Electric Board and the Forestry Commission offer no exception for they have necessitated the construction of houses for staff and workers engaged in the maintenance of power stations and in forest work and management. Some of these dwellings were built in existing villages or burghs, others scattered individually or in small groups, and others again grouped to form new settlements, for example, the forest village, this last constituting a brave attempt to bring people back to areas where the population had all but dwindled away, in addition to meeting forest requirements. The successful adaptation of people from other environments, notably from industrial surroundings, to life in the West Highlands, may be fraught with many difficulties, therefore, in this chapter we are not merely concerned with total number but in assessing whether, on examination of the new populations, hydro-electricity and forestry hold forth real prospects for the repopulation of the region.

Hydro-Electricity

Excluding those employed temporarily on construction work at Glashan and Nant,[a] permanent staff employed by the Board in Mid-Argyll in August, 1960, numbered 42. In relation to individual schemes these were distributed as follows:-

Sloy	-	28
Allt na Lairige	-	0
Shira	-	10
Kilmelfort	-	2
Tarsan	-	2

In the same month the writer conducted a census of Board staff and dependents. 149 persons were recorded - the greater part of this population being housed at Tarbet,[180] Loch Lomondside. 38 of a total of 40 houses occupied by staff were built by the Board, of which 27 - all Board constructed - are in Tarbet.[b]

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[a] Fig.86.

[b] Fig.87A.

State Forestry

Mid-Argyll demonstrates conclusively the importance of state forestry as an employer of labour. The accompanying table lists the numbers employed in individual forests and camps within the region.

Forest	Males	Females	Total
Ardgartan	52	2	54
Asknish	20	-	20
Benmore	42	8	50
Corlarach	8	1	9
Glenbranter	30	3	33
Glendaruel	13	-	13
Glenfinart	44	6	50
Inverinan	28	4	32
Inverliever	53	4	57
Eredine	30 (83)	1 (5)	31 (88)
Kilmartin*	2	-	2
Kilmichael (North)	15	1	16
Kilmichael (South)	13 (28)	1 (2)	14 (30)
Kilmory	13	1	14
Knapdale	49	11	60
Loch Eck	9	1	10
Minard	22	1	23
Strathlachlan	8	1	9
Tighnabruaich	16	1	17
	467	47	514
Camp			
Glenbranter	23	1	24
Kilmun	25	1	26
	515	49	564

*At time of census, Kilmartin was being operated primarily by staff and workers from Kilmichael (South). The census refers to August, 1960.

Approximately 50 of those employed in the forests are non-industrial staff - miscellaneous office staff (mainly clerkesses), and forest staff from assistant-forester grade and above.

A census of employees and dependents recorded 1642 persons. Including the camps the figure is raised to 1746. The forest populations are housed in 432 houses, 94 holdings (87 forest holdings) and 2 hostels.[a] The majority of these dwellings are on land owned by the Commission. An estimated three-quarters of the houses and both hostels were constructed by the Commission. Nearly all the holdings are ex-agricultural subjects.[b]

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[a] Fig.88A.

[b] Hydro and state forest populations are located in Fig.92.

Private Forestry

Only the estates listed in Fig.77 were considered. Certain difficulties were encountered in obtaining statistics as to the numbers of employees and dependents. Firstly, some estates were only willing to divulge information confidentially, that is, on condition that neither the name of the estate nor the statistics appeared in the thesis. Secondly, the owners of three estates were unwilling for private reasons to provide any information. This left 10 of the original 13 estates. Fortunately, these 10 incorporate over 96% of the total forest area. To safeguard the confidential nature with which much of the information was given, it was necessary to tabulate it in group form as shown in Fig.89A. The great majority of forest families live in estate houses. Fig.89B provides information for an individual estate by courtesy of the owner.

A total of 53 males - 2 part-time - and 4 females were recorded as employed in private woodlands.[a] In addition, 4 of the estates employ contract labour on a temporary basis.[b]

The greater part of the information listed for private forestry was submitted in writing by the factors or foresters of individual estates and was obtained in the latter half of 1960.

Together, state and private woodlands directly employ 571 persons in Mid-Argyll. If the state forest camps at Glenbranter and Kilmun are included, the figure is raised to 621 and if hydro employees are added, to 661. Including dependents the respective totals are 1794, 1898 and 2047.

Population Trends

In 1931 the population of Mid-Argyll was 21634.[c] In 1951 the figure had risen to 24527 (1383[d] persons temporarily employed on hydro-electric construction work are excluded).

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[a] A person employed two-thirds or more of his time in forestry is classed here as a full-time forest employee. It ought to be appreciated that on some estates, particularly those with small woodland acreages, forest labour may be employed part-time in other estate work, especially agriculture.

[b] Such labour being employed on a temporary basis is excluded from the above figures. A small business operates contract labour from Easdale.

[c] Fig.7A.

[d] Fig.86.

This represents an increase of 13% which would seem to follow mainly from the continuing growth of population in the parish of Dunoon and Kilmun[a] and the post-war expansion in forestry.

The following table shows the populations of the parishes together with the region of Mid-Argyll at the censuses of 1911, 1931 and 1951. Employees temporarily engaged on hydro-electric construction work are included in the 1951 returns. The 1911 census figures were chosen in preference to those of 1921 to maintain the twenty year sequence and because the latter was held in June, thereby including many holidaymakers.

	Population			Trend	
Parish	1911	1931	1951	1911-31	1931-51
Arrochar	537	670	1367*+	+	+
Craignish	322	280	235	-	-
Dunoon and Kilmun	10227	12361	14171*+	+	+
Inveraray	1204	909	1381*	-	+
Inverchaolain	371	318	443+	-	+
Kilbrandon and Kilchattan	1370	823	574	-	-
Kilchrenan and Dalavich	357	322	349+	-	+
Kilfinan	1869	1489	1253	-	-
Kilmartin	582	455	460+	-	+
Kilmichael Glassary	3107	2970	2914+	-	-
Kilmodan	264	213	260+	-	+
Kilninver and Kilmelford	395	298	279	-	-
Lochgoilhead and Kilmorich	782	716	988+	-	+
North Knapdale	656	550	440+	-	-
Strachur	483	507	580+	+	+
Strathlachlan	217	179	216+	-	+
Mid-Argyll	23100	21634	25910	-	+

*These parishes include men temporarily engaged on hydro-electric construction work at Sloy, Shira and Tarsan. A total of 1383 persons were temporarily employed on hydro-electric construction work in Mid-Argyll in 1951, the great majority from outwith the area.

+These parishes include state forests. It is notable that where state forestry has developed population has increased with the exception of the parishes of Kilmichael Glassary and North Knapdale. Here, population has continued to decline despite forestry, however, at time of census, Commission houses at Ballimore (Kilmichael Glassary) and Achnamara (North Knapdale) had not yet been occupied and consequently, the proportion of single men employed was greater then than now.

In 1960 the population was estimated to be 22393[b]. This represents a percentage decrease of 8.7 over the 1951 total and seems primarily as a result of decreases in

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[a] The parish population increased from 12361 to 14171 between 1931 and 1951. Over the same period the burgh (Dunoon) total rose from 8780 to 9940.

[b] This is an estimate based on the method described on page 218. Men temporarily engaged

population of Dunoon burgh[a] and in the numbers employed in forestry and agriculture. This latter statement may appear to cast doubt on the value of forestry as a means of countering depopulation. However, three things should be borne in mind.

(1) The decrease in numbers employed is a partial reflection of the use of improved technique and increased productivity within the industry.

(2) The decade 1951-61 witnessed increasing use being made of self-employed contractors to do work which formerly had been done by Commission employees, consequently, the numbers of staff and workers employed by the Commission do not directly reflect the employment arising from forestry as, in addition to contract labour, those employed in ancilliary services such as transport, shops, public services, etc., must be added.

(3) Many of the post-war plantations are currently in the stage between planting and thinning, two periods of peak employment in the forest cycle. As a result the number of people employed by the Commission has declined in recent years but ought to rise again as the trees approach the thinning stage.

From these considerations it seems reasonable to assume that despite a temporary decrease in the number of Commission employees, the overall decline in the number employed both directly and indirectly as a result of forestry is probably somewhat less. Unfortunately, no complete record was available of the numbers employed by the Commission over the post-war period in Mid-Argyll. However, figures were available from 1953 and statistics for that year, together with those for 1957 and 1960, are tabulated below.

Year	No. of Commission Employees*
1953	785
1957	642
1960	514

*Applies only to workers and staff engaged directly in forest work and management in the forests of Mid-Argyll, therefore, the camps at Glenbranter and Kilmun are excluded. It may be added that in 1953 neither Kilmartin nor Tighnabruaich forests had as yet been acquired. The decrease in the number of employees between 1953 and 1960 amounts to 271 or approximately 35%.

The above figures are closely related to Employment Exchange returns of the number employed in forestry (includes those employed in private woodlands and in forest contractor work in addition to Commission employees) over the period. Unfortunately, no single

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[a] The population of the burgh at the 1961 census was 9211. No figures were available as to the parish population at time of writing.

Employment Exchange covers the whole of Mid-Argyll but the bulk of the region lies within the exchange areas of Dunoon and Lochgilphead as follows.

Dunoon Exchange:- Parishes of Dunoon and Kilmun, Inverchaolain, Kilfinan, Kilmodan, Lochgoilhead and Kilmorick, Strachur, Strathlachlan. The state forests of Ardgartan, Benmore, Corlarach, Glenbranter, Glendaruel, Glenfinart, Loch Eck, Strathlachlan and Tighnabruaich are included within this area.

Lochgilphead Exchange:- Parishes of Craignish, Inveraray, Kilmartin, Kilmichael Glassary, North Knapdale, South Knapdale, Kilcalmonell. Note that the last two parishes recorded lie outwith the region of study. The state forests of Asknish, Kilmartin, Kilmichael, Kilmory, Knapdale and Minard are included.

Note that the remaining parishes of Mid-Argyll, namely, Kilbrandon and Kilchattan, Kilchrenan and Dalavich, Kilninver and Kilmelford are excluded by reason of their being within the Oban Exchange area which lies primarily outwith Mid-Argyll. In consequence, the greater part of Inverliever and Eredine forests and the whole of Inverinan are excluded from this study. The reader's attention is, however, drawn to the fact that the section of Inverliever Forest which lies within the parish of Kilmartin and includes forest staff and workers resident in Ford and neighbouring holdings[a] is embraced within the returns of the Lochgilphead Exchange. On the other hand, no forest employees are resident in that part of Eredine Forest within the parish of Kilmichael Glassary.

Numbers Employed in Forestry

Year	Dunoon Exchange	Lochgilphead Exchange	Combined Exchanges
1948	389	286	675
1951	414	321	735
1954	394	416	810
1957	412	345	757
1960	267	299	566

The substantial decline in the numbers employed in forestry between 1957 and 1960 is primarily as a result of the virtual completion of planting in state forestry in Mid-Argyll by the latter date, for example, in Knapdale, the number employed dropped from 92 to 60 over the period. Between 1948 and 1960, the decrease was 109 (16%) and since

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[a] Figs.88A and 92.

1954 (the nearest date with which comparisons may be made with Commission employees as noted on the previous page), the number declined by 244 (30%). Comparison of the trends in the tables would suggest that private forestry and private contractor work has had a slight stabilising effect on employment within the industry as a whole. It is further suggested that if the decrease in population in the burgh of Dunoon between 1951 and 1961 is excluded meantime, the overall decline in the population of Mid-Argyll over the same period has been mainly due to the fact that since about 1953/54, employment in state forestry has contracted. Since the agricultural population also continued to decline between the two censuses it is not surprising that by 1960, the estimated population was less than in 1951. The number of agricultural workers alone declined from 771 in 1948 to 633 in 1954 and to 538 in 1960[a], that is, by approximately 30% between 1948 and 1960. At the 1951 census, the effect of the continuing decrease in the rural, that is, agricul-:tural population, was more than offset by an influx of forest employees and families following in the wake of the great post-war drive to increase the acreage under forest in Mid-Argyll. By the mid-fifties as the pace of planting slackened as a result of the Commission being unable to acquire sufficient new land to keep abreast with the planting programme and the inevitable slack period of employment which follows between planting and thinning in the life of a forest, the numbers employed declined, consequently, the estimated population figure for the region in 1960 shows a decrease in comparison with that of 1951 although, it is still well above that of 1931. Obviously, without the addition of the new hydro and forest populations, to say nothing of the now widely available advantages of electricity which most, if not all, local people are agreed has helped to reduce the drift of population although such can never be adequately determined statistically, the pop-:ulation of Mid-Argyll to-day would be substantially less than it was in 1931. Further, it is worth noting that despite the current decrease in the number of Commission employees, the hydro and forest populations constituted in 1960 about 9% of the total population of Mid-Argyll. If the urban areas between Holy Loch and Toward and the burghs of Inveraray and Lochgilphead are excluded, the figure is about 25%.

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[a] Fig.84.

Age Structure and School Roll

Analysis of the accompanying tables[a] shows that both hydro and forest populations are comparatively young, that is, young adults (15-44 age group) and children (0-14 years), constitute high proportions of the total population, both being generally well above the Scottish average and in line with findings made in the Beauly and Tummel regions. Again, Fig.88B seems to suggest that the younger age groups are strongest in the larger groupings, that is, in the forest villages, which may be an expression of man's gregarious nature especially since the majority of forest populations are of urban origin. Further evidence of a healthier age structure may be deduced from the school roll[b] which shows an increase of about 12½% between 1945 and 1960. Although partly consequent on a rising birth rate over the post-war period, the increase is mainly attributable to the presence of the new hydro and forest populations. Individual school rolls reflect the presence of forestry, for example, at Dalavich, Ashfield, Strachur and Kilmichael.[c] Where school populations have declined, forestry is noted for its absence, for example, Inverchaolain, Luing and Tayvallich. Considering that for many decades population trends in Mid-Argyll reflected both a decrease and an ageing of the people, the infusion of a younger age group, particularly since the last war, cannot be other than beneficial in the broadest demo-:graphic sense. But a social study is concerned with more than an assessment of absolute numbers and an analysis of age structure. One must also consider with what success the new populations have been assimilated into local life, their contribution to local society, and whether the introduction of these new populations into the region have been as bene-:ficial as their numbers seem to imply.

General Analysis

When the population of any area declines, social services, for example, schools, shops, and transport, become increasingly difficult to maintain and may eventually be closed or abandoned. This in turn tends to accelerate the drift of population and

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[a] Figs.87A, 87B, 88A, 88B.

[b] Fig.90.

[c] Forestry has been responsible for the construction of new schools or the enlargement of existing ones, as at Dalavich, Eredine, Ashfield (Achnamara) and Strachur. Photo-:graphs of some of these schools are included at the end of this chapter.

jeopardise the continuance of rural life. The increases in population following hydro-electric and forestry developments creates both a need and a justification for improvements in existing services and amenities so tending to reverse the process. A siezeable nucleas can support a local school, village hall, bus ervices and a lively social intercourse. Both the Board and the Commission have come to realise the apparent advantage of housing employees and dependents in large groups where there is a greater chance of an active social life being fostered and of people feeling a sense of belonging to a community. This, however, is not always practicable for it seems inevitable that some employees must be housed in scattered groups throughout the forest so that they may be mobilised more easily and quickly when fire threatens. Obviously, fire danger varies considerably from one forest to another. In Knapdale, for example, fire is not considered a serious risk, there being extensive marches with the sea, the Crinan Canal and fresh water lochs, while large areas are also within reach of existing forest holdings. For this reason the Commission favoured the siting of nearly half the forest population in one locality, namely, Achnamara, Similarly, the site of Dalavich was chosen as a convenient place for building a forest village to house workers employed in Inverliever and Inverinan forests.[a]

The forest village was viewed as a means of solving the Commission's labour problems. In much of Mid-Argyll and particularly so in remoter districts like Knapdale and Loch Awe, local labour was scarce. Further, populations were not only few in number but dispersed and consequently, unsuited to provide the necessary labour for extensive schemes of afforestation. By creating forest villages at Achnamara, Dalavich, Eredine and elsewhere, it was hoped to provide pools of labour which could be drawn upon to meet future forest requirements. In this way the forest village was considered as serving two purposes, the one social the other economic, but closely interrelated and on whose successful adaptation, state forestry was very much dependent. It is as well to distinguish the establishment of new communities where none existed before and the grafting of additional populations on to villages already in existence. Examples of the former include Achnamara (Knapsdale), Dalavich (Inverliever), Eredine (Eredine),

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[a] Plans of forest villages are given in Fig.93.

Glenbranter (Glenbranter) and Port Ann (Asknish).[a] The latter group include Ballimore (Kilmichael), Ford (Inverliever), Minard (Minard), Ardentinny (Glenfinart), Cairnboan (Knapdale) and Succoth (Ardgartan). In each of the last three mentioned the forest communities are so detached from the rest of the villages in which they are situated - Ardentinny, Cairnboan and Arrochar, respectively - that they form almost separate groupings. Only groupings of 9 or more houses are considered here. The forest names are given in brackets. Let us examine these populations in more detail.

At time of census (1960), 28 of the 60 persons employed in forestry in Knapdale were resident in Achnamara. Together with dependents the village population numbered 104 (57 adults and 47 children). The total forest population of Knapdale was 221 (136 adults and 85 children).

When the census was taken, note was made of the origin, former employment and length of residence of forest workers in Achnamara. This information is shown below and refers to 20 of the 24 Swedish timber houses in the village as 3 were then empty, while the fourth was excluded on account of its being occupied by an assistant forester.

Achnamara Forest Village

(a) Origin of Employees

Glasgow	- 15
Aberdeen	- 1
Newton Mearns (Renfrewshire)	- 1
Oban	- 1
Local	- 1
London	- 1
	20

(b) Former Employment

Army	- 1	Fireplace maker	- 1
Builder	- 1	Forest worker	- 1
Butcher	- 1	Foundry worker	- 1
Carpenter	- 1	I.C.I.	- 1
Cleansing Dept. (Glasgow)	- 1	Labourer	- 1
		Lamplighter	- 1
Coalman	- 1	Mill worker (textiles)	- 1
Docker	- 1	Stalker	- 1
Driver (lorries)	- 1	Tailor	- 1
Driver (trains)	- 1	War Department	- 1
Estate Worker	- 1		

[a] Photographs 181-187 (inclusive) refer to forest villages.

(c) Length of Residence		
	8 or more years	- 1
	6 - 8 years	- 3
	3 - 6 years	- 3
	1 - 3 years	- 6
	Under 1 year	- 7

Three things may be immediately deduced from the tables.

(1) Not only are most employees incomers but nearly all are drawn from an urban environ-:ment, notably Glasgow.

(2) Forest employees are drawn from a miscellany of former trades and employment.

(3) Few seem resident any great length of time. The village was constructed in 1952.

In general, observations made of other villages and groupings showed similar diversity, but before proceeding to examine the consequent effects of such variety, let us first consider what brought such people into forestry. The following were found to be major reasons.

(1) Forest Housing. Commission houses are generally considered to be both cosy and comfortable. At Achnamara, for example, the Swedish timber houses contain a kitchen, sitting room, two bedrooms, bathroom, coal shed and wash house. Rents in 1960 were £22 per annum (8/6d per week). Forestry offers a house to city families without prospect of council or corporation house in their home surroundings. One Glasgow family of seven now resident in Achnamara were formerly housed in one room in Anderston, Glasgow. Like many others they had simply come into forest employment in order to acquire a house.

(2) To many, forestry offers something new from the usual routine in employment. This restlessness, currently so common in urban society, is the outward expression of an innate desire to move elsewhere and to start afresh. It is similar to what sociologists now regard almost as a national characteristic of the Scot, namely, the desire to be "up and about", and which in part seems responsible for the high rate of emigration from this country.

Having been brought to a rural environment one may ask whether such people are con-:tent to remain in their new surroundings and in forest employment. Considering that a large proportion of forest families are drawn from an urban environment, it is inevitable that the transfer to surroundings which are in essence rather alien to the Lowlander, will be characterised by many difficulties. Further, forestry in some quarters is still

regarded as an alien activity and an unnatural way of life for the people of this country. Yet, even if such criticisms are regarded as fair, they ignore the resilience of our race and its power to adapt itself to changed circumstances. Again, one must consider that in many areas the traditional way of life was fast dying or had already gone before the Commission appeared and that where such conditions exist, forestry may be the sole way of creating the means by which existing human populations may be stabilised or new people introduced into an area. In this respect Loch Aweside offers a notable example as illustrated by the following table.

Inverliever Forest

	Employees			Dependents			Total		
Employment	1908	1912	1952	1908	1912	1952	1908	1912	1952
Agriculture	23	16	16	20	22	11	43	38	27
Gamekeeping	4	4	1	4	3	1	8	7	2
Forestry	-	4	88*	-	13	157+	-	17	245%
Post Office	3	3	4	1	-	2	4	3	6
Resident only	-	17	1	-	5	4	-	22	5
	30	44	110	25	43	175	55	87	285
Employed in Forestry but non-resident	-	-	9	-	-	-	-	-	9

*Resident in Eredine - 4
+Resident in Eredine - 9
%Resident in Eredine - 13

As may be deduced the population in 1952 was five times what is was prior to state afforestation.

But while forestry in terms of number seems an admirable way of increasing the population in a particular area, many people seem loathe to settle for long. The village of Achnamara is particularly renowned for the high rate of turnover of its inhabitants. Indeed, in the twelve months ending September 1960, one third of all forest families (Commission figures) are estimated to have left Knapdale, the majority from Achnamara. At Dalavich over 100 families are estimated to have left the village in the eight years, 1952-60, some houses having had over half a dozen occupants during the period. Such high rates of turnover are not only a hindrance to the development of community life but cannot be conducive to successful forestry. Both present a serious problem to the Commission in that the problem of recruitment is further aggravated by the fact that good forest workers tend to steer clear of such villages by reason of the type of labour resident

there. This is especially so at Achnamara. A high rate of turnover among employees is a recurrent problem throughout Mid-Argyll although generally, it is much less than in either of the two localities mentioned here. Generally, the problem was found to be greater in forest villages while there was also a noticeable intensification as one travelled from east to west across Mid-Argyll. The following would appear to be major reasons.

(1) Where a large proportion of employees have been recruited from outside and notably from urban areas - this applies particularly to forest villages - the problem is most acute. In many instances incomer families have come from heavily subsidised accommodation and although Commission rents could scarcely be classed as excessive, the liability in a forest house may be correspondingly greater. This coupled with the inevitable increased charges for nearly all services and commodities - largely a reflection of freight charges - tends to throw too great a financial strain on the families' financial resources - the basic wage of a trained forest worker was £8.12. 6d for a 45 hour week in 1960 - and so they drift from the area.

(2) Since the house is inevitably a major attraction, it follows that many quite unsuited to forest work are attracted into the industry and that many will be of a type either unable or unwilling to follow any line of employment for long. Consequently, such people, and most are from an urban environment, return to the town within several weeks or months.

(3) Many Commission families seem lacking in initiative in making the most of the opportunities presented, therefore, they do not have the "perks" that the job could otherwise provide. Again families of urban origin are particularly implied here. For instance, many more families could provide accommodation for tourists and so obtain a lucrative additional source of income or again, the large gardens with which the majority of forest houses are endowed could be intensively cultivated, so providing families with vegatables - these are notably scarce and expensive throughout much of the Highlands - most of the year.

(4) Isolation is a contributory factor promoting both labour and social problems. Populations are notably more static in centres like Glenbranter, Ardentinny and Succoth (Arrochar), where transport services and/or road and rail communications are relatively

good. Such localities have the additional advantageof being within reasonable striking distance of large centres of population, for example, Dunoon or even Glasgow. Consequently, there is less of the feeling of what wives of forest employees described to the writer as "being cut-off from civilisation". But in the west there is a real sense of isolation in many forest communities and so people are less inclined to remain. At Achnamara, for example, there is only one bus daily to Lochgilphead some 10 miles distant. In 1960, the fare was 5/6d return, a figure considered excessive by most village residents. On Saturdays an additional bus is run in the evenings, the return fare being only 3/6d and the service well patronised. Both Dalavich and Eredine are virtually dependent on the local mail bus although on occasion Commission transport may be hired. The return journey to Taymult, the nearest railhead with communication to Oban (3/6d return) or Glasgow, costs 7/6d return by mail bus. Eredine is equally remote, the nearest doctor being resident in Lochgilphead 20 miles away. Under such conditions it is not surprising that many of the town families in particular which comprise the majority of the inhabitants of these villages find considerable difficulty in adjusting their lives to their new environment.

(5) In eastern forests, that is, in Cowal, the Commission has benefitted from being able to recruit a greater proportion of employees locally, in consequence of the greater density of the local population. As a result families are less prone to movement and since many forest families are themselves local people, they take an active part in local community life. From the Commission's view point it is most unfortunate, by reason of the sparse and scattered nature of the local population, that the remoter areas are literally dependent on labour recruitedfrom outside which for a variety of reasons seems to have been mainly recruited from Glasgow, and so generally is less well equipped to adaptation to the con-:ditions. There are also the added difficulties precipitated by the clash of urban and West Highland temperaments which may hinder the growth of close relations between incomer and local to the consequent disadvantage of life generally within the community.

(6) As in Beauly the writer encountered some dissatisfaction with regard to the facilities for secondary education. May it suffice to relate here that with the exception of Arrochar parish and a small adjacent part of the neighbouring parish of Lochgoilhead and Kilmorich where all secondary pupils are conveyed daily to Hermitage School, Helensburgh, the rest

of the region is approximately equally divided as regards senior secondary education between Dunoon Grammar School and Oban High School. The approximate line of demarcation lies in the vicinity of Inveraray. It may be added that junior secondary education is also provided at Inveraray, Lochgilphead and Tighnabruaich.

The broken topography and the long indented coastline of Mid-Argyll necessitates many children having to travel long distances to school and some having to reside, at least during the week, in hostel or private accommodation at or closeby school. It was found that some incomer forest families had experienced considerable difficulty in adjusting their lives to the necessity for one or more children to be away from home perhaps all week at school. This was a difficulty encountered primarily in the forest village of Dalavich and was partly consequent on their being insufficient hostel accommodation and a lack of suitable private accommodation in Oban for school children.[a] The writer also encountered a number of cases, both in Dalavich and elsewhere, where parents with children of post-primary age had already left or were on the point of leaving to return to the town because they were unwilling that their children should have to travel such long distances for secondary education. There is no wish here to imply that this is a problem of as great a magnitude as some of the others noted in this chapter but its consideration serves to illustrate one of the many and very often less apparent and thereby lesser known difficulties with which townspeople may have to contend in a sparsely populated rural environment.

Yet from out of the welter of comings and goings there has slowly emerged a hard core of reasonably satisfied employees and families. Some families who had originally come to Dalavich, for example, and had returned to the town had once more come back to the village. When they first came they had liked many of the things about their new surroundings but after some time the call of the town, the bright lights and the roar of the surging traffic, had proved too strong and so they had left. But after a short time

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[a] It may be recorded that the writer discussed this point with those in authority and is now pleased to report that conditions with regard to hostel accommodation in Oban have considerably improved and that the County Council have laid on a bus to convey Dalavich pupils daily to and from Oban High School.

they were disillusioned to find that town life no longer really held anything for them. In some way unknown to them they missed the "land of the trees" and the quietness of the countryside and so they had been forced to return. For reasons not fully understood they had come to appreciate that their future would always be in forestry.

From the writer's experience it is suggested that even in localities where labour turnover is high, a minimum of about one man in three is a reasonably satisfied employee and has decided to make forestry his career. As a result he and his family are a valuable net addition to the local population. The Commission are due some of the credit for having been far-sighted enough to realise the social significance of a hall in helping to make the break from town to country life more bearable, the construction of a hall forming part of the capital expenditure in the establishment of forest communities. The villages of Achnamara, Dalavich and Eredine, for example, each boast a fine new hall where whist drives, dances and film shows are held and where organisation such as the local W.R.I. and Wolf cub pack meet. Much of course, depends on the residents themselves as to the various uses halls may be put but there can be little doubt that many small communities can and do find much of social and educational value in organised activities. The advent of television has had a certain retarding influence on the continuance of certain community activities but the advantages of television[a] as an educational and entertainment medium, particularly in the remoter districts, far outweigh its disadvantages. Its greatest advantage is that it helps to break down the feeling of being isolated so promoting stability within the local population.

One may well consider whether the Commission could do more to raise the percentage of reasonably satisfied forest employees and families. Inevitably the introduction of new forest populations into Mid-Argyll has, as elsewhere, entailed a shaking-down process which only time can work out for many have come quite unsuited to the life. The Com-:mission's drive to recruit labour, much of which as already noted is drawn from Clydeside, has undoubtedly suffered from the absurdly low rents which, until recently, were a feature of many corporation and council houses in and around Glasgow.[b] It may prove interesting

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[a]Television reception varies considerably but considering the mountainous nature of the countryside it is surprisingly good.

[b]The Commission are not alone in this respect. Low rents in Glasgow have raised difficult-

at some future date to inquire whether recent (1960-62) rent increases in local housing on Clydeside have had any appreciable bearing on forest recruitment and labour turnover. Nevertheless, it is the writer's firm conviction that if the basic wage of the forest worker were substantially increased - an increase of at least 25% is called for - not only would recruitment be stimulated but a better type of worker would be attracted and the Commission could well afford to choose whom they employ.[a] At the present rate of turnover the Commission are constantly training new workers without receiving anything like full bene-:fit from their skills. To allow such to continue is a wasteful application of resources. Despite these assertions, the Commission seem loathe to admit that the "take home" pay packet has much bearing on the problem. It is argued that many men recruited from say Glasgow, would rather take home £1 they had not earned than £10 they had had to work for. But why have to recruit such labour in the first place? That low wages have contributed to the present unrest among forest families was amply supported by field study and dis-:cussion. The reader may recall that this problem was encountered in both Beauly and Tummel but in Mid-Argyll, owing to the Commission's virtual dependence on outside recruit-:ment in large measure from the Lowlands in order to fulfil their afforestation programme, the problem is more acute and thus in need of immediate attention.

One may argue that if the basic wage rate were increased this would be detrimental to agriculture since the wage policies of the two industries are at present and have in the past been closely related. But would this necessarily be so? When construction work began on the various hydro-electric schemes in Mid-Argyll it was considered that great difficulties would accrue to agriculture on account of the high wages paid by the contractors but as supported by experience at Stronafyne, Arrochar (see Chapter 14), hydro-electric construction work is not considered to have had any appreciable bearing on the supply of agricultural labour within the region. Instead, the decrease in the number of agricultural employees seems due primarily to a contraction in the local demand for labour

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[a] The writer is aware that with piece work a good forest worker may earn as much as £20 a week at present, but in attracting labour it is surely the basic rate which counts, not the nebulous amount which may be earned, and for this reason in order that the Commission may be able to attract sufficient labour of the right calibre, a substantial increase in the present basic wage rate of forest workers is advocated.

within the industry itself, coupled with the consolidation of many smaller, less economic subjects into larger units, this last mentioned being in part consequent on the extension of forestry as noted in Chapter 16. Generally, agricultural workers attracted into forestry are men of local extraction or from a like environment, with a flair for forest work. They are of the type who with piece work can earn £20 or more per week and have the additional "perks" which the job can offer. At present rates of pay they are reasonably well satisfied. The present small but, nevertheless, important drain of agricultural labour into forestry is, therefore, unlikely to be influenced or increased to any significant degree by an increase in the basic wage paid to forest workers - a move directed more towards stimulating outside recruitment - consequently, the writer has no hesitation in advocating that the Commission take immediate steps to raise the basic wage level.

There are other less obvious ways in which a higher basic rate of pay and the recruitment of a larger proportion of the better class of employee could be beneficial. At present too many incomers especially in forest villages are of a class which tends to hinder the establishment of close relations with local people and the development of an active and rich social life and spirit within the community. The views of local people towards incomer families are at present all too frequently like those expressed by a Knapdale farmer who, when asked his opinion of the residents of Achnamara village said, "The forest families at Achnamara are a poor quality people. We have little contact with them. Socially they are of no benefit to the district."[a]

There is little doubt that an improvement in forest wages would help stimulate interest within the children of forest employees to seek a career in forestry. One will recall it earlier being stated that by creating forest villages the Commission hoped to establish pools of labour which could be drawn upon to meet future requirements. This implies that a fair proportion of the children of such villages would follow their fathers' line of employment. Unfortunately, in practice few sons of forest workers seem interested

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[a] Locals may also be partly to blame. Apart from the difference in temperament and values between the townsman and the West Highlander, might not a little of deep-seated antagonism towards the Commission be directed towards their employees?

in seeking forest employment. The manual work required of forest employment and the often wet working conditions[a] seem incompatible with the designs of modern youth. Low wages were also expressed as a contributory reason.[b] The author is of the opinion, however, that even were wages increased, forestry is unlikely to attract youth in sufficient numbers to meet future forest requirements.

What of isolation? Is there any solution to the problem particularly in the west? It may be that following further forest expansion and perhaps the establishment of forest industries, existing forest villages and communities may grow sufficiently as to enable an improvement in present transport services. Perhaps the Commission were unduly optimistic in providing housing in forest villages at remote sites in view of the origin and class of much of the labour they were obliged to employ. It may be argued that it would have been better to have housed workers in existing communities less remote and where perhaps the essence of an active community spirit was already in being. In this way forest families may have been more quickly and easily assimilated into local life and less prone to movement.

Socially, this has much to commend it but in terms of forest management and control it would involve unquestionable difficulties. In places forest houses have been sited in or closeby existing communities as for example, at Arrochar, Ardentinny and Minard to their mutual advantage. Why this was not done at Glenbranter, Glendarvel and Sron na Bruic, where forest families were sited instead within two or three miles of the existing villages of Strachur, Clachan of Glendaruel and Minard respectively, seems beyond compre-:hension. Similarly, the present forest community at Achnamara may have been better sited at Tayvallich although it is doubtful whether in view of the class of labour in the former this would have ameliorated present difficulties. But Dalavich and Eredine are in a rather different position for in neither case is there an existing village

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[a] A factor not readily appreciated but of importance is that the countryman is more weather conscious than the townsman - an essential requisite in an outdoor job like forestry. Somehow through both his innate and acquired knowledge of nature the former can keep much drier in wet weather than his counterpart from the town. A dry man is a contented man and more inclined to give of his best than one whose clothes are wet and uncomfort-:able - a factor in favour of employing rural rather than urban labour in forestry.

[b] Fig.91

nearby - even Kilchrenan is about eight miles from Dalavich. It may be argued that Ford would have been a better site for housing families from both villages but one is reminded that:-

(1) There was no proper road along the west shore of Loch Awe until recently and in view of the subsequent acquisitions to Inverliever Forest and nearby Inverinan, there was need to house workers at a site which could serve both forest. Dalavich fulfils this role. Eredine on the eastern shore fulfils a similar function with regard to Eredine Forest.

(2) The Commission have latterly built a few houses in Ford but prior to this the hamlet consisted essentially of a hotel, post office, church and school, on a secondary road with no public transport service. The nearest sizeable centre is Lochgilphead, twelve miles distant.

Because of these considerations it is doubtful whether Ford could have fulfilled the Commission's needs better than the existing villages of Dalavich and Eredine, to say nothing of the danger of fire and the requirements which this implies. This does not detract, of course, from the general view that wherever practicable it is better to add to existing communities rather than to establish new ones. That the Commission are alive to this may be judged from the fact that at present they have no plans for creating new forest villages in Mid-Argyll. The value of an addition to the existing population of a community is well illustrated by Arrochar/Tarbet. Within the past decade, the following clubs have grown and flourished - a golf club on former farm land behind the parish hall in Tarbet, two football clubs (a senior and a junior), an indoor shooting club, a carpet bowls club, a youth club, a wolf club pack and an active W.R.I. The incomer hydro and forest populations take an active part in all of these pursuits some of which were started by incomers thus, not only has parish population increased,[a] but

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[a] The population of the parish of Arrochar in 1931 was 670. By 1951, this figure had risen to 1367 which included several hundred men employed on the Sloy hydro-electric scheme. In 1960, the population was estimated to be 775 (local registration officer estimate) of whom 231 (29%) were hydro and forest families.
In 1909, the Admiralty commenced the building of a Torpedo Range, the range depot being sited on the Argyll shore of Loch Long opposite Arrochar. 83 persons were employed in 1960 - 70 on the range itself, 10 in maintenance at the works department and 3 women employed as cooks and cleaners. This figure included 35 single men housed in a hostel. Married personnel are housed in 24 houses (12 Argyll County Council) near to the range depot and 16 (all Admiralty) in Arrochar. About 70% of those employed are local people while the majority of the rest are from other parts of the West Highlands and Islands.

the new populations have helped revitalise community life. Therein lies the measure of success. An additional advantage in Arrochar/Tarbet is that forest employees, even although they are grouped in their own small community[b] about ½ mile from the centre of Arrochar, can meet and have social intercourse with people of different employment to themselves. This is rarely possible in an all-forest village and was a disadvantage expressed by a number of employees resident in Dalavich and Achnamara.

One must conclude that while state forestry has been of value in providing employment and bringing new people to Mid-Argyll, its demographic implications in relation to the numbers involved are less than expected. For various reasons, the industry is largely dependent on labour recruited from the Lowlands. Normally, one may expect the transfer of population from town to country, particularly to a Highland environment, to be beset with difficulty but here, the position has been further aggravated by the recruitment of too large a percentage of a class of labour which, afflicted with what may be described as congenital instability, is prone to quit forest employment after only a short trial and return to the town. This seems largely consequent on the low basic wage paid to forest workers which is insufficient to attract better workers in sufficient number.

Statistics were quoted as evidence of the high rates of turnover of forest labour within Achnamara and Dalavich forest villages and of the difficulties which this has entailed not only for forest management but in the fostering of relations with the surrounding local inhabitants and in the development and growth of an active community life and spirit. There would seem little doubt that where incomer populations have been settled in existing communities, greater social success is assured which can and may help to revitalise the social life within such communities to the benefit of all concerned. The successful integration of the hydro and forest populations in Arrochar/Tarbet into the local life of the community is an example worthy of commendation.

Finally, there would seem grounds for believing that, despite the many difficulties, about one man in three has decided to make forestry his career and, therefore, one family

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15-20 are children of school age. Undoubtedly the presence of the torpedo range helped counteract depopulation in the parishes of Arrochar and Lochgoilhead and Kilmorich in the early decades of the century. This may be noted from the population statistics in Figs.8A and 10A.

b Smooth

in three is a net addition to the population of Mid-Argyll and to the Highlands in general. Forestry has, therefore, been a means of bringing people back to the Highlands. Perhaps most interesting and valuable of all is that not only is the population of Mid-Argyll greater to-day than in 1931, but a younger element has been infused into it thus creating a healthier age structure within many communities than formerly.

In this discourse on forestry we have been primarily concerned with the incomer forest worker and his family of Lowland stock. Little has been said of the value of the forest holder as an element within the population. Generally, holders are local men or from a similar environment who, on account of long residence within an area, may form the backbone of the labour force and provide a link between forestry and agriculture. At Seafield,[a] for instance, the holder was initially guaranteed six months employment (150 days per annum) in forestry. In practice he works full-time in forestry but is allowed four weeks (20 days) per annum to work the holding. Much of the work done on the holding must, therefore, be done in the evenings and at weekends. Income from the holding averages £300 per annum[b] and is a valuable supplement to the holders' forest wage which generally ranges between £10 and £20 per week depending on piece work. Some holders partake in tourism but this is not done at Seafield.

By creating holdings the Commission have retained a valuable element in the population which otherwise would probably have left through lack of employment and opportunity. The Acland Committee[208] in 1918 eminently understood the social value of the forest holder when they wrote: "Families scattered on new holdings in forest areas will be a net addition to the resident rural population."

In a sense the planting of private woodlands serves a similar purpose, surplus agricultural labour being absorbed by forestry.

The reader may be excused thinking that the social implications of hydro-electricity have been sadly neglected in the course of this survey but in comparison with forestry

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[a] The holdings of Seafield is in Knapdale. Information as to its agricultural potential was given in Chapter 16.

[b] Rents of holdings are low. In Knapdale, in 1960, they averaged between £18 and £24 depending on acreage.

the measurable effects are much less spectacular.[a] One is reminded that in numerical terms hydro populations number less than one-tenth of those resident as a consequence of forestry and are limited in distribution mainly to the north-east of the region, particularly Tarbet and Cairndow.

Reference has already been made to the significance of the hydro and forest pop-:ulations on social life in Arrochar/Tarbet. When the station at Loch Sloy was planned it was decided to house the maintenance workers at Tarbet rather than at Inveruglas which is relatively remote and where space restrictions precluded house building to the number the Board required. Land was bought at Ballyhennan next to the former United Free Church and here 27 houses were built in a cresent round an open space which it was intended later to develop into a shrubbery and park. The houses are of more than one design and are stone-fronted to conform with the church and to blend with the landscape. Although all electric, one room incorporates an open hearth for those who prefer a coal fire. One of the most delightful things about the site is the fine view of the conical peak of Ben Lomond soaring majestically above the lower ridge of Creag a' Bhocain. Unfortunately, the open space in front of the crescent has not been developed as earlier intended and was growing a fine crop of weeds when last visited in 1960.

But this detracts little from the amenities of the scheme. Hydro families commented on how warm and comfortable the houses were and all were agreed that Arrochar/Tarbet, although sometimes quiet in winter, was an ideal place in which to live. Nearby is the railway station (West Highland Line - Glasgow/Fort William/Mallaig) with a diesel service to Craigendoran near Helensburgh from which the famous "Blue Train" electric service operates to Glasgow. There is also a bus service to Glasgow via Loch Lomondside. There can be few places in the Highlands with better transport services to and from the "bright lights," a situation of no mean importance for young people. It is, therefore, distressing to find that owing to the lack of employment locally - situations with the Board are limited and forestry seems to offer few attractions for the young - there is an exodus of young men and women from the district. This problem will be considered in more

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[a] The availability of electric power is of great social significance although its effects cannot be measured statistically. This aspect was considered at length in Chapter 15.

detail in the next chapter. Returning to the amenities earlier mentioned in the paragraph, it was not surprising to find that most hydro-families had been resident in the district since the Sloy Scheme began operating in 1950.

The only other sizeable hydro grouping is at Cairndow, a small hamlet on the shore of Loch Fyne. The village is closeby the main A83(T) road. This has both its advan-:tages and disadvantages, the latter in that most residents prefer to travel further afield for entertainment and social recreation rather than support similar developments locally.

While in the long run, the successful adaptation to life and work in a rural environment rests ultimately with the individual, and some may take longer to become acclimatised than others, there can be no doubting the demographic and social significance of the developments carried through by the North of Scotland Hydro-Electric Board and the Forestry Commission in Mid-Argyll. In the absence of any pre-conceived development plan to resuscitate the region, these two authorities almost alone have done much to reverse the drift of population through the availability of electrical power, the provision of employment and the influx of new people. The balance between success and failure can be a fine one and the Commission in particular, have been faced with many difficulties. Nevertheless, the fact that so much has been achieved in such a short space of time - mainly since 1945 - is indeed worthy of commendation.

FIG. 86 MID-ARGYLL - NUMBER OF MEN EMPLOYED ON HYDRO-ELECTRIC CONSTRUCTION WORK, 1950 - 1961 INCLUSIVE

Scheme	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Sloy	1781	742	288	-	-	-	-	-	-	-	-	-
Allt na Lairige	-	-	-	-	256	295	113	-	-	-	-	-
Shira	536	418	698	772	748	812	848	666	565	243	71	-
Tarsan (Striven)	334	323	189	93	159	132	103	15	-	-	-	-
Kilmelfort	-	-	-	-	131	137	114	-	-	-	-	-
Glashan	-	-	-	-	-	-	-	-	-	-	196	232
Total[a]	2651	1383	1175	865	1294	1476	1178	681	565	243	267	232
All Hydro Schemes	7770	4450	4854	6227	7365	8570	6595	5713	4818	2385	2161	2270

[a] In 1960 and 1961, 303 and 374 employees respectively were engaged on construction work on the Awe Scheme, a small proportion of whom were employed on the Nant Section, the catchment basin of which lies partially in our area of study. 240 men were also employed on construction work at the Glashan Scheme.

The Census figures refer to the month of May, except for the year 1961, when the figures refer to the number employed as at 15th April. The figures include labour force, administrative, clerical and camp staff. No figures are now available for years prior to 1950.

FIG. 87A MID-ARGYLL - CENSUS OF HYDRO BOARD EMPLOYEES AND DEPENDENTS, AUGUST 1960

Place	No. of houses	Adults	Children[a]	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s[b]	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Tarbet (Ballyhennan Crescent)	27	67	43	110	Not Specified					
Arrochar	1	2	-	2	-	-	-	-	2	-
Cairndow	8	17	9	26	4	5	-	13	4	-
Lochhead (Loch Striven)	2	4	2	6	1	1	-	4	-	-
Kilmelford	2	4	1	5	-	1	1	1	2	-
Mid-Argyll	40	94	55	149	-	-	-	-	-	-

All houses are Board built with the exception of 1 Council house at Kilmelford and 1 (stone built) at Arrochar. The statistics for Tarbet were by courtesy of the local Registration Officer, hence there is no specification as to age groupings.

[a] Sex of children:

Cairndow	-	4 boys and 5 girls
Lochhead	-	1 boy and 1 girl
Kilmelford	-	1 boy -
		6 boys and 6 girls

[b] Refers to children still at school and young adults attending further education, e.g. University, but because of age are included here as adults.

G. 87B MID-ARGYLL - CENSUS OF HYDRO BOARD EMPLOYEES AND DEPENDENTS, AUGUST 1960, WITH SELECTED AGE GROUPINGS, EACH EXPRESSED AS A PERCENTAGE OF THE TOTAL POPULATION.

Place	Adults	Children	Adults, 15 - 44 age group[a] Percentage of total population	Adults, 15 - 44 age group[a] Percentage of adult population
Tarbet (Ballyhennan Crescent)	60.9	39.1	-	-
Cairndow	65.4	34.6	50.0	76.5
Mid-Argyll	62.8	37.2	-	-

[a] Includes those in category 15s in Fig. 87. This age grouping (15 - 44) is significant as it normally includes all women of childbearing age.

The Scottish percentages are 75.4, 24.6, 43.0 and 57.0 respectively. These figures refer to the 1951 Census as at time of writing, those for the 1961 Census were not yet available. The respective percentages for the three county districts of Cowal, Mid Argyll and South Lorn - an area appreciably larger than that under survey - are 79.3, 20.7, 36.5 and 47.4. These figures, which also refer to the 1951 Census, are indicative of an ageing population.

FIG. 88A MID-ARGYLL - CENSUS OF FORESTRY COMMISSION EMPLOYEES AND DEPENDENTS AUGUST 1960

Note The statistics for Ardgartan and Askmish forests were given by courtesy of the local foresters, hence there is no specification as to age groupings.

Key to houses

FW	- Forest Worker	C.B.	- Commission built
F	- Forester	N.C.B.	- Non-Commission built
FWH	- Forest Worker's Holding	ST	- Small Tenancy (Agricultural)

\+ Refers to children still at school and young adults attending further education, e.g. University, but because of age are included here as adults.

(i) ARDGARTAN AND ASKNISH FORESTS

Forest	Place		No. of Houses	Adults	Children	Total
Ardgartan	Succoth	FW	27[a]	55	39	94
		F	1[b]	2	4	6
	Glen Loin	Hostel	1	5	-	5
		FWH	1[c]	2	4	6
	Arrochar		3[d]	8	-	8
	Between Range and Ardgartan Caravan Park		2[e]	4	4	8
	Foot of the Rest	F	1[f]	2	-	2
	Coilessan	FW	6[g]	9	7	16
		FWH	1[g]	3	3	6
	Lochgoilhead	FW	2[h]	4	-	4
		F	1[h]	2	1	3
		Hostel	1[j]	11	-	11
	The Rest	FWH	4[j]	5	7	12
			49 houses 2 hostels	112	69	181
Asknish	Port Ann	F & FW	16[k]	27	24	51
	Middle Kames	F	1[k]	4	3	7
	Lochgair	FW	2[k]	2	-	2
	Gortanronach		2[k]	5	6	11
			21	38	33	71

a Includes 3 houses erected under 1st development and 24 under 2nd development. In latter group one house is occupied by an Under-forester and one by a retired forest worker. 4 houses empty at time of census. All C.B.

b Situated at junction of Glen Loin road and A.83(T).

c Feorlin, Glen Loin.

d In village - non Commission. 3 married personnel and 2 single. Only married personnel's houses listed.

e Non Commission. Range - Torpedo Range.

f Rest - Rest and be Thankful. Assistant forester. House C.B.

g Houses C.B. Holding - Coilessan.

h Houses C.B. 1 FW empty.

j Holdings in Glen Croe. 1 empty at time of census.

k All C.B. except at Gortanronach. 2 houses at Port Ann occupied by Hydro Board employees on Glashan scheme at time of census, therefore excluded.

(ii) BENMORE AND CORLARACH FORESTS

Forest	Place		No. of houses	Adults	Children*	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s+	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Benmore	Deerpark Benmore[a]		7	21	8	29	2	6	3	12	6	-
	Benmore Estate[a]		3	7	1	8	-	1	-	5	2	-
	Gairletter, Blairmore[a]		1	2	-	2	-	-	-	-	2	-
	Rashfield[a]		1	3	-	3	-	-	-	1	2	-
	Dunselma, Strone[a]		1	2	3	5	2	1	-	2	-	-
	Dunoon[b]		3	5	2	7	1	1	-	1	4	-
	Sandbank[b]		5	9	5	14	2	3	-	4	5	-
	Blairmore[b]		1	2	4	6	2	2	-	2	-	-
	Strone[b]		1	2	-	2	-	-	-	-	2	-
	Kilmun[b]		1	4	1	5	1	-	-	4	-	-
	Miscellaneous[c]		18	18	-	18	-	-	-	18	-	-
	Benmore	FWH	5	10	3	13	-	3	-	8	2	-
	Stonefield	FWH	1	5	2	7	-	2	-	4	1	-
	Bernice	FWH	1	2	3	5	1	2	-	2	-	-
			49	92	32	124	11	21	3	63	26	-
Corlarach	Toward[a]		1	2	-	2	-	-	-	1	-	1
	Innellan[b]		3	4	-	4	-	-	-	2	2	-
	Dunoon[b]		1	1	-	1	-	-	-	1	-	-
	Toward[b]		1	1	-	1	-	-	-	1	-	-
	Knockamillie No.1	FWH	1	2	1	3	1	-	-	2	-	-
	Knockamillie No.2	FWH	1	2	-	2	-	-	-	-	2	-
	Linnhe Mhor	FWH	1	2	1	3	-	1	-	-	2	-
			9	14	2	16	1	1	-	7	6	-

[a] Commission houses both C.B. and N.C.B.

[b] Non-Commission houses.

[c] 18 single employees - 14 forest workers and 4 non-industrial. Forest workers accommodated as follows:- Dunoon - 1; Kilmun - 4; Strone - 2; Blairmore - 1; Sandbank - 4; Benmore - 2. Place of residence of non-industrial employees unspecified. All N.C.B.

[*] Sex of children:

Benmore	-	22 boys and 10 girls
Corlarach	-	2 girls

The Forester Training School at Benmore is excluded. Normally about 30 students are in residence.

(iii) GLENBRANTER, GLENDARUEL AND GLENFINART FORESTS

Forest	Place		No. of Houses	Adults	Children*	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s+	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Glenbranter	Glenbranter	FW	12[a]	26	18	44	7	11	-	21	5	-
		F	3[b]	7	4	11	1	3	-	2	5	-
		FWH	17[c]	38	11	49	5	6	-	18	17	3
		ST	1[d]	3	5	8	2	3	-	2	1	-
			35[e]	74	38	112	15	23	-	43	28	3
Glendaruel	Duileter	FW	6[f]	9	10	19	1	9	-	7	2	-
		F	1[g]	4	3	7	1	2	1	2	-	1
	Duileter (nearby)	FW	2[g]	4	4	8	-	4	-	4	-	-
		Bothy	1[h]	1	-	1	-	-	-	-	1	-
		FWH	3[h]	7	6	13	-	6	-	5	-	2
			12 houses 1[j] bothy	25	23	48	2	21	1	18	3	3
Glenfinart	Ardentinny	FW	12[k]	28	14	42	6	8	-	19	9	-
	Glenfinart	FW	6[m]	10	8	18	2	6	-	10	-	-
		F	4[n]	9	4	13	4	-	-	7	-	2
		FWH	14[p]	36	13	49	6	7	-	21	12	3
	Miscellaneous		2[p]	4	-	4	-	-	-	4	-	-
			38	87	39	126	18	21	-	61	21	5

a Timber houses Glenbranter forest village. All C.B. 2 empty at time of census. A hostel for forest workers in Glenbranter was closed in 1956.

b 2 in village - C.B., 1 in glen - N.C.B.

c Majority in glen between village and Strachur. Referred to by number.

d Ballemeanoch Farm.

e Finnish timber houses - C.B. 2 empty at time of census.

f Wooden bungalow - C.B. Beside timber houses.

g Finnish timber houses about 250 yds. from Duileter.

h In Glendaruel.

j Swedish timber houses - C.B.

k On camp site - C.B. at foot of Glen Finart. The hostel on this site was closed in 1956. The camp site was former naval property.

m At foot of Glenfinart - N.C.B.

n In Glenfinart. 2 empty at time of census.

p 2 single men and 2 youths. Only houses of single men listed. 2 single men from Benmore School. temporarily employed but excluded from census.

x Sex of children:

Glenbranter	18 boys and 20 girls
Glendaruel	10 boys and 13 girls
Glenfinart	15 boys and 24 girls
	43 boys and 57 girls

(iv) INVERINAN AND INVERLIEVER FORESTS

Forest	Place		No. of houses	Adults	Children*	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s+	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Inverinan	Inverinan	FW	3[a]	5	5	10	2	3	-	5	-	-
		F	1[b]	2	-	2	-	-	-	2	-	-
	Kilchrenan	FW	3[c]	9	7	16	2	5	-	8	-	1
	Drissaig (Loch Avich)		1[d]	1	-	1	-	-	-	1	-	-
		FWH	8[e]	19	7	26	4	3	1	13	5	-
			16	36	19	55	8	11	1	29	5	1
Inverliever (Inverliever)												
	Dalavich	FW	46[f]	91	82	173	39	43	-	86	5	-
		F	2[g]	4	2	6	1	1	-	4	-	-
	Ford	FW	9[h]	19	5	24	2	3	1	6	12	-
	Post Office		1[j]	3	1	4	-	1	-	-	3	-
	Miscellaneous		-[k]	8	-	8	-	-	-	6	2	-
	Eurach (by Ford)		1[m]	2	-	2	-	-	-	1	1	-
		FWH	6[m]	11	7	18	5	2	-	6	5	-
			65	138	97	235	47	50	1	109	28	-
Inverliever (Eredine)												
	Eredine	FW	19[n]	39	32	71	17	15	-	31	8	-
		F	2[p]	4	7	11	2	5	-	4	-	-
		FWH	5[q]	15	4	19	-	4	-	8	6	1
			26	58	43	101	19	24	-	43	14	1
	Total Inverliever		91	196	140	336	66	74	1	152	42	1

a 2 houses at Lochside, other known at Craigdhu Cottage. All C.B.

b All C.B.

c In village. 1 unnamed, others known as Torradamph Cottage and Old Church Manse. All N.C.B.

d Drissaig farm.

e Referred to as Kilmun, Annat Croft, Lower Achachenna and FWH Nos 2 - 6 (inclusive).

f Forest village. 28 Finnish timber houses and 18 brick. All C.B. 15 occupied by employees in Inverinan. 4 empty at time of census.

g 1 wooden bungalow, 1 brick built. Both C.B.

h Finnish timber houses. All C.B. 1 occupied by widow of a former employee.

j Employees from Kilmartin. Not being resident in forest areas, homes are not listed.

k Eurach farm.

m Referred to as Nursery, Nos. 1 and 2; Kilmaha, Nos. 3 and 6; Torran, Nos. 4 and 5. Torran No. 5 occupied by a retired employee and wife.

n Forest village. 19 brick houses. All C.B.

p 1 wooden bungalow, 1 brick built. Both C.B.

q Referred to as Braevallich Croft and Durran FWH Nos. 6 - 9 (inclusive).

* Sex of children:

Inverinan	-	10 boys and 9 girls
Inverliever (Inverliever)	-	51 boys and 46 girls
Inverliever (Eredine)	-	25 boys and 18 girls
		86 boys and 73 girls

(v) KILMARTIN, KILMICHAEL AND KILMORY FORESTS

Forest	Place		No. of houses	Adults	Children*	Total	Age Groupings: Children 0 - 4	Children 5 - 14	15s+	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Kilmartin	Ballagowan	FW	1[a]	2	-	2	-	-	-	-	-	2
	Salachary		1[b]	2	2	4	2	-	-	2	-	-
			2	4	2	6	2	-	-	2	-	2
Kilmichael (North)	Near Loch Leathan		4[c]	7	3	10	3	-	-	5	2	-
	Near Lechuary	F	1[d]	2	2	4	-	2	-	1	1	-
	Knockalava	FWH	1	2	-	2	-	-	-	2	-	-
			6	11	5	16	3	2	-	8	3	-
Kilmichael (South)	Ballimore	FW	20[e][f]	46	40	86	17	23	-	32	9	5
	Near Add Bridge	F	1	2	-	2	-	-	-	-	2	-
	Auchoish	FWH	1	2	-	2	-	-	-	-	2	-
	Ducharnan	FWH	1	3	3	6	1	2	-	2	-	1
			23	53	43	96	18	25	-	34	13	6
	Total Kilmichael		29	64	48	112	21	27	-	42	16	6
Kilmory	Lochgilphead	FW	5[g]	23	2	25	-	2	-	16	5	2
	Ardrishaig	FW	2[g]	5	5	10	2	3	-	5	-	-
	Drumlussa, Ardrishaig	F	1[h]	1	-	1	-	-	-	1	-	-
	Dunamuck (north of Cairnbaan)	FW	1[h]	3	-	3	-	-	-	-	2	1
	Kilmory		1[k]	1	-	1	-	-	-	1	-	-
	Blarbuie	FWH	1	4	1	5	-	1	-	2	2	-
			11	37	8	45	2	6	-	25	9	3

Note: 8 men from Kilmartin are employed in Inverliever.

a Trapper's house - N.C.B.

b Salachary farm.

c 4 Finnish timber houses all C.B.

d Supervisor's house - C.B.

e 20 brick houses - only 19 occupied by Commission employees. 4 are occupied by men employed in Kilmichael (North) and 4 by men employed partially in both forests - Kilmichael (North and South). All houses C.B. Ballimore is shown on the O.S. 1" Map as Kilmichael Glassary.

f Wooden Bungalow - C.B.

g Non Commission houses.

h N.C.B.

k Estate house - N.C.B. Occupied by a clerkess employed at Cairnbaan.

x Sex of children

Kilmartin	2 girls
Kilmichael (North)	1 boy and 4 girls
Kilmichael (South)	23 boys and 20 girls
Kilmory	5 boys and 3 girls
	29 boys and 29 girls

(vi) KNAPDALE AND LOCH ECK FORESTS

Forest	Place	No. of Houses	Adults	Children*	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s+	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Knapdale	Achnamara	FW 23[a]	46	42	88	13	29	-	31	12	3
		F 5[b]	11	5	16	2	3	-	10	1	-
	Cairnbaan	13[c]	26	17	43	4	13	1	13	10	2
	Tayvallich	1[d]	6	-	6	-	-	-	4	2	-
	Crinan	1[d]	1	-	1	-	-	-	-	1	-
	Cairnbaan Dunardry	1[d]	2	-	2	-	-	-	1	1	-
	Ballimore	1[d]	1	-	1	-	-	-	1	-	-
	Lochgilphead	1[d]	4	-	4	-	-	-	3	-	-
	Ashfield	1[d]	5	4	9	-	4	1	4	-	-
	Bellanoch	1[d]	3	1	4	-	1	-	2	1	-
		FWH 10[e]	31	16	47	7	9	-	21	8	9
		58	136	85	221	24	61	2	90	36	8
Loch Eck	Loch Eckside	FW 6[f]	5	9	14	4	5	-	5	-	-
		F 1[g]	2	1	3	1	-	-	2	-	-
		ST 3[h]	11	7	18	-	7	-	9	2	-
	Dunoon	1[j]	2	-	2	-	-	-	2	-	-
		11	20	17	37	5	12	-	18	2	-

[a] Forest village. Swedish timber houses. All C.B. - 3 empty at time of census.

[b] 1 in village, others N.C.B.

[c] At Cairnbaan Camp. Occupied by various staff and personnel. All C.B.

[d] Non Commission houses.

[e] Referred to as Arinafad, Ardnackaig, Barnagaad, Barnluasgan, Braeface, Craglans, Dunans, Kilmichael Inverlussa, Seafield, South Leachnabaan.

[f] 4 were empty at time of census. All N.C.B.

[g] Swedish timber house - C.B.

[h] Referred to as holdings Nos. 1, 2 and 4.

[j] Non Commission house.

[k] Sex of children.

	Knapdale	48 boys and 37 girls
	Loch Eck	11 boys and 6 girls
		59 boys and 43 girls

(vii) MINARD, STRATHLACHLAN AND TIGHNABRUAICH FORESTS

Forest	Place		No. of Houses	Adults	Children*	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s+	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Minard	Sron na Bruic	F & FW	8[a]	15	10	25	6	4	1	11	3	-
	Birdfield	F	1[b]	2	1	3	-	1	-	2	-	-
	Barr Liath	FW	1[c]	2	1	3	-	1	-	-	2	-
		F	1[d]	2	-	2	-	-	-	-	-	2
	Minard	FW	9[e]	17	2	19	-	2	-	10	6	1
	Cumlodden		1[f]	4	1	5	-	-	-	2	2	-
	Furnace		2[g]	3	-	3	-	-	-	-	3	-
	Miscellaneous		1[h]	1	-	1	-	-	-	1	-	-
			24	46	15	61	6	9	1	26	16	3
Strathlachlan	Leanach	F & FW	4[j]	7	11	18	1	10	-	4	3	-
	Miscellaneous		2[k]	6	3	9	-	3	-	-	6	-
	Strone	FWH	1	2	3	5	1	2	-	2	-	-
			7	15	17	32	2	15	-	6	9	-
Tighnabruaich	Glen Caladh	FW	1[m]	2	-	2	-	-	-	-	2	-
	Ardlamont		1[n]	2	-	2	-	-	-	-	2	-
	Kames		7[n]	23	5	28	-	5	-	13	10	-
	Millhouse		1[n]	4	2	6	-	2	-	4	-	-
	Tighnabruaich		3[n]	8	1	9	-	1	1	3	4	-
		FWH	3[p]	9	3	12	-	3	-	5	4	-
			16	48	11	59	-	11	1	25	22	-

a All C.B. 7 occupied by Commission employees including one assistant forester. 1 occupied by Hydro Board employee temporarily working on Glashan Scheme.

b N.C.B.

c Trapper's house - N.C.B.

d Retired forester's house - N.C.B.

e Only 3 of these were erected by the Commission. Of the remainder, 3 are Council houses and 3 ex-estate houses.

f A Cumlodden Estate house in Minard.

g Non-Commission houses.

h Referred to as the Stable house. Situated by the lochside south of Sron na Bruic.

j Finnish timber houses. All C.B.

k Non-Commission houses. Referred to as Burnside and Leanach Cottage.

m House C.B.

n Non Commission houses.

p Referred to as Glenachouil, Kames Farm and Kilbride.

x Sex of Children:

Minard	9 boys and 6 girls
Strathlachlan	10 boys and 7 girls
Tighnabruaich	7 boys and 4 girls

(viii) GLENBRANTER AND KILMUN CAMPS

Place			No. of Houses	Adults	Children	Total	Age Groupings: Children 0 - 4	Children 5 - 14	Children 15s+	Adults 15 - 44	Adults 45 - 64	Adults 65 and over
Glenbranter												
	Contractors:	Glenbranter	1[a]	2	1	3	1	-	-	2	-	-
		Strachur	1[b]	2	-	2	-	-	-	1	1	-
		Dunoon	3[b]	5	-	5	-	-	-	1	4	-
			5	9	1	10	1	-	-	4	5	-
	Engineers:	Strachur	4[b]	9	2	11	-	2	-	5	4	-
		Dunoon	14[b]	24	6	30	6	-	1	14	9	-
		ST	1	1	-	1	-	-	-	1	-	-
			19	34	8	42	6	2	1	20	13	-
Kilmun		Miscellaneous	26[c]	39	13	52	Not Specified					

[a] A caravan on the camp site.

[b] Non Commission houses. Some are Council houses.

[c] Distributed as follows: Dunoon - 9; Sandbank - 5; Kilmun - 3; Benmore - 3; Kirn - 3; Strone - 2; Ardentinny - 1. All are non Commission houses except 1 at Benmore.

(ix) MID-ARGYLL (SUMMARY)

Forests	Holdings: Houses	Forest	Other	Hostels	Population: Adults	Children	Total
Ardgartan	43	6	-	2	112	69	181
Asknish	21	-	-	-	38	33	71
Benmore	42	7	-	-	92	32	124
Corlarach	6	3	-	-	14	2	16
Glenbranter	15	17	1	-	74	38	112
Glendaruel	10[a]	3	-	-	25	23	48
Glenfinart	24	14	-	-	87	39	126
Inverinan	7	8	1	-	36	19	55
Inverliever	59	6	-	-	138	97	235
Eredine	21	5	-	-	58	43	101
Kilmartin	1	-	1	-	4	2	6
Kilmichael (North)	5	1	-	-	11	5	16
Kilmichael (South)	21	2	-	-	53	43	96
Kilmory	10	1	-	-	37	8	45
Knapdale	48	10	-	-	136	85	221
Loch Eck	8	-	3	-	20	17	37
Minard	24	-	-	-	46	15	61
Strathlachlan	6	1	-	-	15	17	32
Tighnabruaich	13	3	-	-	48	11	59
	384	87	6	2	1044	598	1642
Camps							
Glenbranter	22	-	1	-	43	9	52
Kilmun	26	-	-	-	39	13	52
	432	87	7	2	1126	620	1746

[a] Includes bothy.

The Forester Training School at Benmore is excluded. Normally about 30 students are in residence.

FIG. 88B MID-ARGYLL - CENSUS OF FORESTRY COMMISSION EMPLOYEES AND DEPENDENTS, AUGUST 1960, WITH SELECTED AGE GROUPINGS, EACH EXPRESSED AS A PERCENTAGE OF THE TOTAL POPULATION

Place	Adults	Children	Adults, 15 - 44 age group[a] Percentage of total population	Percentage of adult population
Forests				
Inverliever/Eredine	58.3	41.7	45.5	78.1
Knapdale	61.5	38.5	41.6	67.6
Glenbranter	66.1	33.9	38.4	58.1
Strathlachlan	46.9	53.1	18.8	40.0
Forest Villages				
Dalavich	53.1	46.9	50.3	94.7
Achnamara	54.8	45.2	39.4	71.9
Glenbranter	60.0	40.0	41.8	69.7
Mid-Argyll (excluding camps)	63.6	36.4	Not Specified[b]	
Mid-Argyll (including camps)	54.5	35.5	Not Specified[b]	

[a] Includes those in category 15s in Fig. 89. This age grouping (15 - 44) is significant as it normally includes all women of child bearing age.

[b] Due to there being no specification as to age groupings in Ardgartan and Askmish Forests.

The Scottish percentages are 75.4, 24.6, 43.0 and 57.0 respectively. These figures refer to the 1951 Census as at time of writing, those for the 1961 Census were not yet available. The respective percentages for the three county districts of Cowal, Mid Argyll and South Lorn - an area appreciably larger than that under survey - are 79.3, 20.7, 36.5 and 47.4. These figures, which also refer to the 1951 Census, are indicative of an ageing population.

FIG. 89A MID-ARGYLL - CENSUS OF PRIVATE FOREST EMPLOYEES AND DEPENDENTS, AUGUST 1960

		Age Groupings		
No. of Estates	No. of Houses	Adults (15 and over)	Children (0 - 14 years)	Total
10[a]	51[b]	100[c]	52	152

[a] These represent 10 of the 13 estates listed in Fig. 77. Together they represent 85% of the land area and over 96% of the forest area. No information was obtainable for the 3 remaining estates.

[b] This figure includes 4 bothies and 2 houses occupied by men employed part-time in forestry.

[c] This figure includes those listed under category 14s (see Fig. 88A).

FIG. 89B MID-ARGYLL - CUMLODDEN ESTATE, CENSUS OF FOREST EMPLOYEES AND DEPENDENTS, AUGUST 1960.

Estate				Age Groupings		
Land Area Acres	Dedicated Woodland Acres	Other Woodland Acres	No. of Houses	Adults 15 and over	Children 0 - 14 years	Total
6000	499	210	5[a]	14	3	17[b]

[a] All houses are on the Estate.

[b] There are 8 forest employees - there was then a vacancy for another - with 6 adult dependents and 3 children.

Permission to tabulate this information was granted by courtesy of Sir George Campbell, Bt., on behalf of his son, Mr. Islay Mark Campbell, to whom the estate now technically belongs.

FIG. 90 MID-ARGYLL - SCHOOL ROLL, 1945 - 1960 INCLUSIVE

OUNTY OF ARGYLL

Parish and School	19 45/46	19 46/47	19 47/48	19 48/49	19 49/50	19 50/51	19 51/52	19 52/53	19 53/54	19 54/55	19 55/56	19 56/57	19 57/58	19 58/59	19 59/60
unoon and Kilmun															
unoon Grammar	931	928	1042	1086	1002	1111	1081	1104	1120	939	918	921	939	883	847
t. Mun's R.C.	221	210	237	210	196	204	198	186	192	197	198	180	174	165	156
irn	270	266	269	279	264	283	295	304	306	516	505	529	513	500	584
nnellan	71	70	72	65	63	53	54	56	66	68	61	58	55	56	58
andbank	130	133	149	137	155	141	143	146	159	145	149	155	150	143	125
ashfield	31	24	12	17	17	23	20	22	28	33	29	28	28	28	26
trone	87	87	93	94	100	96	91	77	71	81	81	78	77	73	78
rdentinny	19	16	13	14	14	8	17	15	19	14	22	19	17	17	16
nveraray															
nveraray J.S.	83	80	89	93	96	109	104	105	123	120	114	122	117	127	120
nverchaolain															
outh Hall	10	12	12	9	11	13	18	20	19	15	11	10	6	7	3
nverchaolain	8	5	3	6	6	8	8	7	6	10	11	11	11	9	7
ilbrandon and Kilchattan															
asdale	10	9	11	10	13	11	12	11	7	9	8	10	17	18	20
uing	13	13	15	13	15	16	12	12	7	5	5	4	4	4	4
orth Luing	18	18	20	21	20	22	26	25	18	15	11	8	7	5	3

Parish and School	19 45/46	19 46/47	19 47/48	19 48/49	19 49/50	19 50/51	19 51/52	19 52/53	19 53/54	19 54/55	19 55/56	19 56/57	19 57/58	19 58/59	19 59/60
ilchrenan and Dalavich															
rdchonnel	21	16	17	10	11	15	13	20	19	19	21	18	19	21	27
ilchrenan	23	20	20	21	20	18	17	18	22	18	17	18	15	15	15
alavich	29	24	25	24	20	21	48	49	51	57	53	51	55	53	50
ilfinan															
tter Ferry	7	13	12	8	10	6	12	11	13	10	7	7	9	14	6
ighnabruaich J.S.	150	122	129	135	138	147	150	146	139	129	132	119	122	117	120
ilmartin															
ord	17	14	17	13	19	18	25	18	20	20	18	17	18	11	13
ilmartin	47	47	46	38	45	38	44	37	39	33	29	25	23	24	28
ilmichael Glassary															
ilmichael	26	23	20	18	26	28	31	38	53	49	46	43	41	36	36
airnbaan	20	27	26	28	20	15	19	17	18	15	14	14	15	16	16
urnace	36	38	33	39	30	36	35	34	32	29	34	35	34	35	39
ochgilphead J.S.	273	267	311	325	328	317	362	388	394	407	415	396	408	413	403
inard	28	26	20	24	29	22	22	20	22	18	12	13	18	15	24
ilmodan															
ilmodan	8	3	-	-	-	-	-	-	16	18	14	18	27	23	21
tronafian	6	10	13	21	25	28	26	26	13	16	17	12	7	8	7

Parish and School	19 45/46	19 46/47	19 47/48	19 48/49	19 49/50	19 50/51	19 51/52	19 52/53	19 53/54	19 54/55	19 55/56	19 56/57	19 57/58	19 58/59	59/60
ochgoilhead and Kilmorich															
ochgoilhead	33	37	46	44	53	55	61	57	51	45	41	41	46	44	42
lencroe[a]	19	14	16	17	17	20	30	16	16	15	12	12	16	12	8
ilmorich	28	25	24	28	28	30	35	30	28	28	27	22	19	21	21
orth Knapdale															
shfield	7	10	10	6	7	9	23	23	23	24	20	36	34	30	35
ellanoch	14	16	14	11	13	13	14	15	16	17	19	11	8	11	10
ayvallich	26	21	17	14	13	14	11	8	6	6	5	5	7	9	10
trachur															
trachur	59	61	73	67	68	76	83	78	76	79	85	100	97	92	91
trathlachlan															
	8	12	13	18	17	13	16	16	17	24	27	23	16	19	10
ounty of Dunbarton															
rrochar															
rrochar (primary)[a]	71[b]	83[b]	83	94	89	79	78	94	100	96	93	95	106	99	96
(secondary)[a]	11	9	-	-	-	-	-	-	-	-	-	-	-	-	-
ermitage School[a] (Helensburgh)	6[c]	4[c]	18	20	17	22	36	38	41	30	30	34	34	34	40
Total	2855	2813	3040	3077	3015	3138	3269	3287	3366	3359	3311	3298	3309	3207	3215
Oban High School[d]	918	893	1012	971	1016	1017	1031	1105	1151	1178	1215	1279	1285	1332	762[e]

NOTES FOR FIG. 90

a Arrochar School is in Tarbet about 2 miles east of Arrochar village. Former schools at Ardlui (head of Loch Lomond) and Tighness (Arrochar) were closed in 1942 and 1946 respectively. Pupils are at present conveyed to Arrochar School from Ardlui, Arrochar, Firkin, Glen Douglas, Morelaggan and Succoth, the last named by agreement with Argyll County Council. Glencroe School caters for primary children from Ardgartan, Coilessan, Glencroe and the Range (Torpedo Range) Cottages, but secondary children travel daily by bus to Hermitage School, Helensburgh by agreement between Argyll and Dunbarton County Councils.

b A Junior Secondary Department existed at Arrochar in sessions 1945/46 and 1946/47. During this period only Senior Secondary pupils required to travel to Helensburgh. Today, and since 1947, all secondary pupils must do so.

c Shows the number of secondary pupils attending Hermitage School from Arrochar parish and the north-eastern portion of the parish of Lochgoilhead and Kilmorich. Senior Secondary pupils only are listed for sessions 1945/46 and 1946/47.

d It was not practicable to procure the exact numbers of children attending Oban High School from the region over the period 1945-60, but for session 1960/61, the following information was available.

Pupils in lodgings attending Oban High School	Cowal*	-	4
	Mid Argyll*	-	32
	South Lorn*	-	18
			54
Pupils conveyed to Oban High School	Easdale/Kilminver	-	28
	Kilmelford	-	15
	Dalavich*	-	10
			53

* These are County Districts of Argyll. See Fig. 84 as to their definition.

* Pupils from Dalavich formerly lodged in Oban.

Note: Two parishes in South Lorn - Kilmore and Kilbride and Glenorchy and Inishail - and one in Mid Argyll - South Knapdale, - lie outwith the region. Since Kilmore and Kilbride includes Oban burgh it may be excluded from consideration. Glenorchy and Inishail is a large parish extending from Connel in the west to Rannoch Moor in the east. Pupils in the west are conveyed daily by the bus which serves Taynuilt and Connel - mainly outwith the parish - but the east being mountainous is sparsely populated, and so the few pupils (estimated 6) attending school in Oban must lodge there. By contrast, South Knapdale is relatively well populated. On a population basis (South Knapdale contains about 40% of the population of the district of Mid Argyll), the number of pupils in lodgings and attending Oban High School is estimated as 12. These are Senior Secondary pupils, other secondary pupils attend Lochgilphead J.S. School.

Therefore, the number of pupils in lodgings and attending Oban High School from the region of study is 36. If those being conveyed daily are included, the number is 89.

An estimate based on the total school roll for the area of study would show the numbers attending Oban High School over the period 1945-1960 as follows:-

	19 45/46	19 46/47	19 47/48	19 48/49	19 49/50	19 50/51	19 51/52	19 52/53	19 53/54	19 54/55	19 55/56	19 56/57	19 57/58	19 58/59	59/60
ending Oban High ool from Mid-Argyll	80	79	85	86	84	81	90	91	93	93	91	91	91	89	89
ised total of school l for whole of Mid- yll	2935	2892	3125	3163	3099	3219	3359	3378	3459	3452	3402	3389	3400	3296	3304

e The Primary department of the High School was transferred to Rockfield School, Oban, in session 1959/60, therefore, the figure listed (762) refers only to secondary children.

FIG. 91 MID-ARGYLL - QUESTIONNAIRE

The accompanying questionnaire was presented to and completed by children of Dalavich school. As the school was closed for vacation during the visits made by the author, the questionnaire was completed during term by kind permission of the headmaster - Mr R.W. Honeyman.

In the actual questionnaire presented to the children an answer space was pro-:vided below each question. The questions were prepared with a view to obtaining further information as to the backgrounds and views of children living on Loch Aweside. The questionnaire was presented mainly to children of forest workers, although two children of other employees were included for comparison. The answers gained have been summarised and a short note on the findings has been included below. The questionnaire was presented in March, 1961.

Note

While appreciating the shortcomings of such a questionnaire, for example, farm work would be unlikely to prove as popular a means of employment once children have grown up, the information gained is, nevertheless, of value. Some interesting points to note are:-

(1) Children of forest employees are mainly of Lowland origin.

(2) Under "A" the answers to Questions 8 and 9 are evidence of instability of forest populations.

(3) Only one boy was interested in forestry as a career, yet the majority of children were content to live in Dalavich and would like to live there when grown-up. There is an obvious need for the Commission to try and interest children of forest employees in forestry and to take steps to make the industry more attrac-:tive to young people.

(4) Nearly all children wished to remain at school after the age of fifteen. This may in part be due to the attractions of the local school, but it is felt that the lack of alternative suitable employment locally, particularly for school leavers of fifteen years of age, is a contributory factor; whether, of course, all these children would benefit from senior secondary education is an entirely different matter which lies outwith the concern of the questionnaire. It is obvious that as the children grow up, more and more families are going to be split by the requirement of one or more members of the family having to leave home to seek employment elsewhere, that is, unless alternative means of employ-:ment other than in forestry develop in the valley.

(5) There is an obvious need for more children's organisations in Dalavich despite the commendable efforts being made by the local headmaster and his wife (see accompanying photographs).

To conclude, while children in Dalavich would seem to have much the same inter-:ests and outlook as children elsewhere, there is little doubt that the local environ-:ment has stimulated an interest in rural life, although unfortunately, not in fores-:try.

This questionnaire and answers may be compared with those in Fig. 42.

Q U E S T I O N N A I R E

1. State whether you are a boy or a girl.

2. What is your age? Give years and months.

3. Where were you born? Give the name of the place and county.

4. What is your father's nationality? In your answer write "Scots", "English", "Irish", "Welsh", etc.

5. What is your mother's nationality? Answer as in Question 4.

6. What is your father's present job?

7. What was your father's previous job? If it is the same as in Question 6, write "Same as No.6" in the answer space.

8. Where did you live before?

9. When did you come to live in Dalavich? If you have lived in Dalavich all your life, put a stroke in the answer space.

10. What class are you in at school?

11. What school will you attend after you leave primary school in Dalavich?

12. Do you want to stay on at school after you are 15 years old? Answer "Yes" or "No".

13. What do you want to be when you grow up? State the type of work and give reas-:ons. If you do not know what you would like to do, write "Don't Know" in the answer space.

14. Would you like to work with the Forestry Commission when you grow up? Answer "Yes" or "No" and give reasons. If you have already said that you wished to work with the Forestry Commission in Question 13, put a stroke in the answer space for this question.

15. Would you like to work on a farm or croft when you grow up? Answer "Yes" or "No" and give reasons. If you have already said that you wished to work on a farm or croft in Question 13, put a stroke in the answer space for this question.

16. Would you like to stay in Dalavich when you grow up, or, would you prefer to live in some large town or city? Do you find life in Dalavich too dull? Answer "Yes" or "No" and give reasons.

17. What do you like to do in your spare time? Write a short note. Your answer should include mention of what games you play, what hobbies you have, whether or not you belong to any organisation, e.g. Brownies, Wolf Cubs, etc., and whether you like watching T.V. and going to the films when they come to Dalavich.

18. Do you have a part-time job after school hours or on Saturday mornings? If so, what do you do?

19. Do you go to Oban, Lochgilphead or Glasgow or any other big town often? Do you like going or do you prefer to remain in Dalavich? Give reasons.

A. CHILDREN OF STATE FOREST EMPLOYEES

Answer

Question

1. 7 girls and 4 boys.

2. 9 yrs. 8 mos. - 12 yrs. 8 mos.

3. Edinburgh (2); Glasgow (4); Campbeltown; Lennoxtown, Stirlingshire; Bridge of Allan, Stirlingshire; Carradale, Argyll. 1 was not stated.

4. 9 Scots and 2 Irish.

5. 8 Scots, 2 German, 1 English.

6. All forest workers.

7. 9 forest workers with the Commission, 2 Army (trade unspecified).

8. Hong Kong (2); Glasgow; Ardrishaig; Ford, Argyll; Minard, Argyll; Carradale, Argyll; Glasgow; Barcaldine, Argyll; Carradale, Argyll; Kilchrenan, Argyll. Answers given in same order as those in Question 3.

9. 1951, 1954, 1957, 1958(2), 1961(5), 1 resident at Inverinan since 1961.

10. Primaries 5, 6 and 7.

11. Oban High School.

12. Ten expressed the wish to do so.

13. The careers of the girls and reasons are as follows:-
    (a) Two wished to become travelling vets., as they were very interested in animals.
    (b) Two wished to become nurses as they liked caring for people.
    (c) Three were uncertain.

    The careers of the boys and reasons are as follows:-
    (a) Joiner - liked woodwork.
    (b) Farm worker - liked working with animals.
    (c) Two were uncertain.

14. Only one (boy) expressed a wish to seek employment with the Commission for the reason he liked living in the country. Reasons given against forest employment included, "Pay too small", "Work is too hard", "Work is dirty", "No interest in trees".

15. By contrast five girls and three boys stated they would like to work on a farm. Their love for animals was by far the main reason. Those who did not want to work on a farm had already expressed the wish to seek other employment.

16. Six of the eleven (3 girls and 3 boys) would like to remain in Dalavich mainly because they prefer rural life to living in a town. The others found life in Dalavich too dull and would have to leave Dalavich in any case for future employment, but nearly all still preferred country life to town life.

Question

17. Girls - There are no organisations, for example, Brownies, T.V., going to the local film shows, reading, collecting photographs of "pop" singers and records, and model making were popular pastimes.

Boys - Nearly all the boys were members of the Wolf Cubs (Wednesday even-:ings). Hobbies and interests included football, cricket, fishing, bird watching, photographs, T.V., attending local film shows.

18. No-one did, there being none available.

19. Only two children (1 boy and 1 girl) seem to visit town regularly but about half of the remainder would like to be able to go more often though no-one expressed the wish to live in town. Oban is the main shopping centre.

B. CHILDREN OF OTHER EMPLOYEES

Answer

Question

1. 2 girls.

2. 10 yrs. 2 mos. and 14 yrs. 8 mos. Note that the answers to Questions 3, and 6-13 inclusive, are given in the same order as in this question.

3. Dumbarton; South Uist.

4. Both Scots.

5. Both Scots.

6. Worker on hydro-electric scheme (Awe Scheme?); Farm worker.

7. Forest worker with Commission; Farm worker.

8. Clydebank; Taynuilt, Argyll.

9. 1956; Resides at Arichamish farm near Ford.

10. Primary 5; Receives correspondence tuition.*

11. Oban High School; Not stated.

12. Yes; No.

13. Scientist - wishes to invent things to profit mankind. Uncertain.

14. Neither stated any desire to work in forestry for reasons that the work was too dull and held no interest for them.

15. Both would like to work on a farm as both loved animals.

16. Neither expressed any desire to live in Dalavich when grown-up. Reasons expressed were that life was too dull, there was nowhere to go at nights, little to do and life was too quiet.

17. Both would have joined Brownies or Girl Guides if there had been such organisations locally. T.V. and the local film shows were popular.

Question

Reading, the collecting of "pop" records, and the usual children's games were indulged in.

18. Neither did because there were no part-time jobs available for children.

19. Both would like to go to visit big towns more often although they seldom got the chance to do so.

* Since about 1939, children have been taught in this way in some of the remoter areas of Argyll.

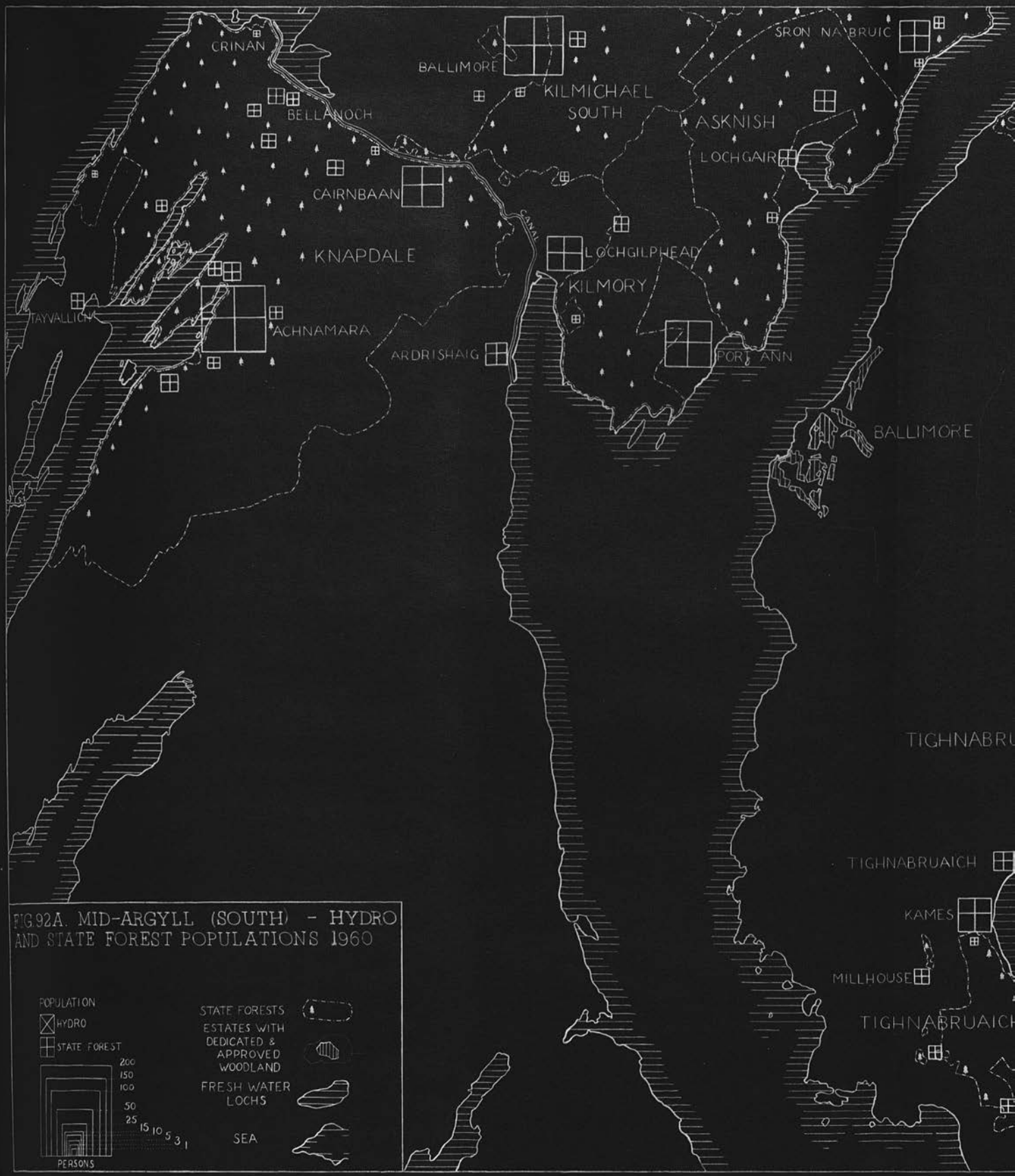
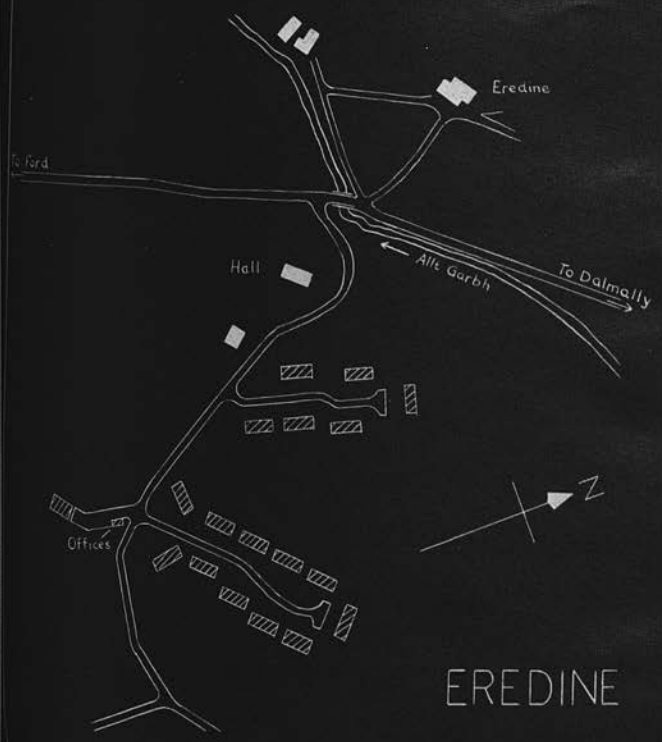


FIG.92A. MID-ARGYLL (SOUTH) - HYDRO AND STATE FOREST POPULATIONS 1960


FIG 92B. MID-ARGYLL (WEST)
HYDRO AND STATE FOREST
POPULATIONS 1960
KILCHRENAN
INVERINAN
INVERINAN
MELFORT
KILMELFORD
GLENMORE
DALAVICH
INVERLIEVER
EREDINE
INVERARAY
DURRAN
EREDINE
FORD
EDERLINE
KENMORE
GLASVAAR
FURNACE
KILMARTIN
CUMLODDEN


INVERARAY
ARDKINGLAS
CAIRNDOW
INVERARAY
KENMORE
ARDGARTAN
SUCCOTH
TARBET
ARROCHAR
LOCHGOILHEAD
STRACHUR
COILESSAN
ARDGARTAN
LEANACH
GLENBRANTER
LOCH
LUSS



EREDINE

SUCCOTH

DALAVICH

ACHNAMARA

KEY

Forest Houses

Note: Succoth is really part of the village of Arrochar

Yards

0 25 50 75 100

FIG. 93 MID-ARGYLL
PLANS OF FOREST VILLAGES

PHOTOGRAPHS

180. Ballyhennan Crescent Hydro Scheme, Tarbet, Loch Lomondside.

181. Swedish Timber Houses, Achnamara Forest Village, Knapdale.

182. Post Office and General Store, Achnamara Forest Village.

183. Dalavich Forest Village, Loch Aweside - a General View.

184. Finnish Timber Houses, Dalavich Forest Village.

185. Post Office, Dalavich Forest Village.

186. A Happy Group, Dalavich Forest Village. See also Phot. 1.

187. Empty Forest Houses, Eredine Forest Village, Loch Aweside. These empty houses are a reminder of the difficulties experienced by the Forestry Commission in retaining labour.

188. Ashfield School, Knapdale, prior to State Forest Development.

189. Ashfield - the New School at Achnamara (1960).

190. The New School at Ardchonnell, Eredine.

191. New Extension to the School at Strachur.

Note: Phots. 188-191. The influx of forest populations has led to an increase in the numbers of children on school rolls and necessitated the construc-:tion of extensions to schools or the erection of new schools.

192-193. Sports Day - Dalavich School. (Courtesy R.W. Honeyman, Esq., Dalavich).

194-195. Christmas Pantomime - Dalavich School. (Courtesy R.W. Honeyman, Esq., Dalavich) Scenes are being enacted from an adaption of "Snow White and the Seven Dwarfs", written specially by the headmaster. See Fig. 90 for information regarding school rolls in Mid-Argyll.

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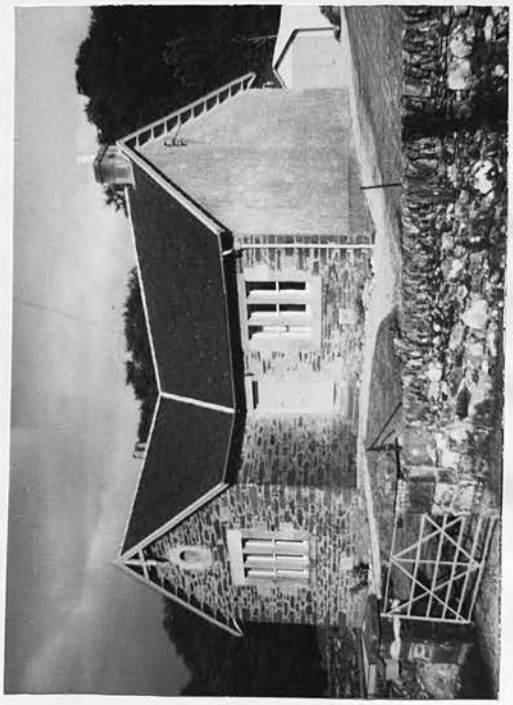

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CHAPTER 18

HYDRO-ELECTRICITY AND FORESTRY - THEIR ECONOMIC IMPLICATIONS

The North of Scotland Hydro-Electric Board have nearly completed all their schemes in Mid-Argyll although work is still in progress on both Glashan[a] and Nant. No further schemes are contemplated, consequently, the number of hydro employees and dependents is unlikely to grow in the future save for the addition of one or two families each to be housed at Lochgair and Inverinan - the dependents of men employed on maintenance work at the Glashan and Nant power stations. By contrast, forestry, both state and private, is in most instances in the early stages of development and, therefore, can be expected to employ a much greater labour force in the future, even allowing for improvements in technique, than it does at present.

The reader will recall from the previous chapter that despite a decrease in the number employed in forestry in Mid-Argyll within the past 6 - 8 years, largely as a consequence of contraction in the rate of planting and the present growing stage of many of the state forests, state and private forestry together gave employment to the formidable figure of 621 persons - 568 males and 53 females - in 1960. Unfortunately, no figures for the region were available prior to 1953 but the fact that the number of persons employed in forestry in the whole of Argyll rose from 95 to an estimated 1200 between 1930 and 1960, will give the reader an indication not only of the tremendous expansion in the labour force but of the significance of forestry as an employer of labour in an area of Scotland formerly predominantly agricultural and relatively lacking in raw materials and natural resources.[b]

What of employment prospects for the future? One will recall from an earlier chapter[c] that when forests are in full rotation it is estimated that one man may be employed to as little as 35 acres of forest. Supposing for convenience we base our

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[a] Glashan began operating in August 1962.

[b] The reader is referred to the information listed for Inverliever Forest on page 476, and the Survey of Minard in Fig. 94.

[c] Page 114.

estimate instead on one man to 50 acres. At present there are nearly 71,000 acres already under plantations or scheduled for forestry within state forests in Mid-Argyll.[a] There are a further 11,000 acres in private woodlands already planted or scheduled for forestry under the Dedicated or Approved Woodlands' schemes and in productive forestry on the Ballochyle Estate.[b] These figures take no account of either (1) further expansion in the acreage under state and private forestry, or (2) production from woodlands - some contain stands of productive timber - on private estates (other than Ballochyle) outwith the Dedicated and Approved Woodlands' schemes. A conservative estimate, therefore, places 82,000 acres under forestry in state and private woodlands.

Applying the principle of one man to every 50 acres when a forest is in full rotation, it may be deduced that 1640 persons will be employed eventually within the present forest area. But such would apply only if all the forests were at the same stage of growth. In practice this is not so. Inverliever, for instance, the earliest to be acquired is already nearing maturity while the more recent plantings in, for example, Kilmartin and Tighnabruaich, will not reach this stage until at least the end of the present century. Again, the introduction of improved techniques is bound to save on manual labour. In consequence, labour requirements may be cut by 10 - 20% so that instead of 1640, the labour force employed may probably be somewhere between 1300 and 1500. However, if we allow for even a further 100 men employed by private forest contractors (the figure is probably less) over and above the 621 directly employed today by the Commission and the private woodland owner, the combined figure is still only about one-half of the estimated future forest labour force in Mid-Argyll.

What is meant here by "the future"? After the recent decline (late fifties) in the labour force it is expected that within the next two decades as the production of thinnings increases, the number of employees will show a corresponding increase.

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[a] Fig. 75.

[b] Fig. 77.

The increase may perhaps be slow to begin with as labour requirements within individual forests may be somewhat erratic, but ought to rise more quickly in the seventies as mature fellings increase. Somewhere between 1980 and the end of the century the total labour force should approach 1300 - 1500, that is, about double the present figure. As it is the Commission's policy to call more and more upon the timber trade to help cut and market thinnings and mature timber - private contractors are also being called upon increasingly to carry out such work in private woodlands - it follows that the bulk of this expected increase will be in labour employed by timber merchants, and contractors.

Taking 1500 as the estimated future labour force, forestry will then directly support some 4500 - 5000 people (including dependents) in Mid-Argyll compared to the present total of about 1900 by state and private forestry alone. This is equivalent to about 20% of the current total population or to about 50% if the populations of the three burghs, including the closely built-up area between the Holy Loch and Toward Point, are excluded.

As aforesaid, it may confidently be expected that both the acreage under state and private forestry will increase in the future. Considering the large acreage already under state plantations it would seem to be the Commission's economic advantage to acquire more land in the region. Further, there seems every likelihood - barring an economic slump or war - that the Government will continue to give financial inducement to private growers to extend the acreage of managed woodlands on their estates. On this account there would seem grounds for believing that by the end of the century, the number employed directly in forestry may be considerably in excess of the 1300 - 1500 stated, perhaps even as many as 1800 - 2000, in which case the total forest population may well exceed 6000.

It should be appreciated that none of these estimates takes into account the advantages to the local economy, particularly trade and transport services, which would undoubtedly follow from the presence of such populations.[a] There is no doubt that trade and services in general, particularly in such centres as Ardentinny, Arrochar, Cairnbaan, Lochgoilhead, Minard and Strachur, not to mention the forest villages, have greatly benefited from the presence of hydro and/or forest families in Mid-Argyll. Likewise, no allowance has been made for the establishment of wood processing plants - there are already two in operation - as a consequence of the large scale development of forestry. However, before considering particular industries, let us first assess what prospects there are for industrial development in the region and whether the availability of abundant sources of electricity and the extension of large scale afforestation have or are likely to attract industry.

Industrial development as defined within the narrower limits of the term is scarcely developed in Mid-Argyll. Undoubtedly, there are many reasons but most apparent are that geographical factors seem, in the past at least, to have been heavily weighted against the establishment and growth of manufacturing industry. The relative lack of raw materials in commercial quantities including sources of power - coal, the rugged nature of the countryside, the lack of any rail communications except through the extreme east of the area, the long indented coastline but paucity of sea communications resulting in the long haulage of most supplies by road

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[a] At 30th September 1960 the Commission's labour force in the West Conservancy District numbered approximately 1200. Payments in respect of salaries for the year ending 30th September 1960, amounted to £6,600 and wages of £574,800, the greater part of which was spent locally. Rents, rates, heating and lighting cost a further £11,000. These figures given give some indication of some of the hidden benefits which may accrue from forestry.

In the same year other expenses in the District included:-

Road Making	£51,600	A proportion of this work done by private contractors
Building - new constructions	5,500	
Other building work	31,500	
Fencing	21,000	
Grants to private woodlands	58,600	

Total payments amounted to £913,200 and receipts to £249,800, of which £210,700 was from the sale of forest produce and £5,500 from the sale of nursery produce. These figures clearly illustrate that outlay still greatly exceeds income partially because of the expenses of capital development in the newer forests and the fact that many woodlands have still not reached the productive stage.

via Lochs Lomond, Long and Fyne, so adding to freight costs and relative distance from markets in comparison with Lowland sites, are but some of the more obvious factors serving to preclude industrial development in Mid-Argyll. For long, agriculture - hill sheep - was the major employer of labour together with a little fishing, quarrying, sawmilling and tourism, the last mentioned being especially important in the resorts located on the Clyde coast and Kyles of Bute.

Nevertheless, there a few small industrial concerns (wood using industries are excluded meantime) currently operating in Mid-Argyll, which provide the dual role of giving diversity to employment and of providing employment in the areas in which they are located. Some examples are:-

(1) A factory for the processing of seaweed at Kames on Loch Melfort established by Alginate Industries Ltd. The seaweed used is imported by sea from the Outer Hebrides and Ireland, the parent factory being at Barcaldine on Loch Creran in Benderloch (north of Oban). The factory was established during the war and although originally was powered by diesel, a mains supply is now obtained from the Board.

(2) A small factory for the making of machine tools at Easdale. This is one of the Rollo enterprises - initiated by Mr. John Rollo from his main works at Bonnybridge, Stirlingshire - to bring new industry to the Highlands.

(3) A pottery and crafts centre at Strachur. This industry began as a crafts centre with a little tartan weaving but recently, new works have been acquired at Dunoon for making pottery to meet the demand of a rapidly expanding market both in Scotland and England. Clay is imported from Stoke-on-Trent and an experienced man in the pottery trade has been employed to direct operations. At present (1960), the crafts centre employs 10 people and the factory at Dunoon is expected initially to give work to 12 - 15 employees which will later expand to 50 (mainly women).

(4) The quarrying of slates and road metal. The former has been in commercial operation since the late 18th Century and is located mainly on the islands of Seil and Luing. Output is but a fraction of what it formerly was, a number of quarries having been flooded by the sea in 1881. The largest stone working quarry is at Crarae on Loch Fyneside. After being closed for many years production recommenced

about eight years ago.

(5) There are a number of miscellaneous contractor businesses carrying out repair and building work scattered throughout the region although mainly located in the larger centres of population, for example, Dunoon.

Has the availability of electricity been of advantage in attracting new industry to the area?[a] The answer must be that no case was found where a business could be inferred as having developed in the region as a direct consequence of the availability of electricity. While it cannot be denied that the availability today of virtually unlimited power supplies is a common factor of value to existing industry, power supplies alone are seemingly not a sufficiently strong incentive to attract new industry into the area, although in the case of Crarae Quarry, there is evidence to suggest that the availability of electric power following from the presence of the Board's schemes, was a determining factor favouring reopening. One must be excused regret that despite the publicity given to the Board's schemes and the efforts made by the Board themselves to attract industry to this and other regions of the Highlands, these efforts have not met with more success. It would seem more economic to transmit power from Sloy, Shira, etc., to a Lowland site rather than utilise it for industry in Mid-Argyll, and if this be so, then it is more economic to establish industry in Renfrewshire or Ayrshire, rather than on the Cowal side of the Clyde. Again, land owner and tourist interests offer little encouragement to the establishment of manufacturing industry, but must industrial and tourist developments conflict? Surely by the application of modern techniques in factory design there should be no difficulty in reconciling the two interests.

However, it is the writer's belief that fundamentally new developments, or indeed the extension of existing enterprises, cannot occur without efficient and economically competitive transport and if we have cheap, efficient transport and power for commercial purposes at attractive rates, then these together will attract industry to Mid-

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[a] Electricity was available pre-war in the Clyde coastal area between Holy Loch and Toward through the Dunoon Electricity Company founded in 1929. Additional supplies were furnished by the Clyde Valley Electric Power Company from 1941 onwards, until both companies were nationalised in 1947 and the North of Scotland Hydro-Electric Board assumed responsibility for all generation, transmission and distribution of electricity in the area.

Argyll, or for that matter, to any other region of the Highlands. This is a combination which cannot be effected by the Hydro Board alone. Government activity is required to devise and execute a plan for an integrated transport system while there is no doubt that the cost of hydro-electricity would be lower, were it not for the exorbitant rate of interest[a] - there is a case here for interest - free loans - charged on Government loans granted to the Board.

Power economics apart, how could transport services best be improved in Mid-Argyll? The answer must surely lie in making much wider and better use of the natural communication link, namely, the sea. The sea has three great advantages.

(1) Mid-Argyll is a series of peninsulas and islands deeply cloven by the long arms of sea lochs and almost detached from the Lowlands by the Firth of Clyde and the long deep inlet of Loch Long.

(2) It requires no maintenance.

(3) It is wide and cheap to use.

At present, there are fairly frequent steamer and ferry services along the Clyde coast. One of the most advantageous services is the ferry from Dunoon to Gourock which cuts the 76 mile road journey from Dunoon to Glasgow by as much as 40 miles. But further west services are less frequent and many towns served by passenger/freight services have only one daily service or less, while Inveraray, the county town, has only a summer service. Again, small places along both shores of Loch Fyne, for example, Strachur, and on the Atlantic seaboard, have no steamer service today although fifty, or perhaps one hundred years ago, a steamer regularly called. Neither should it be forgotten that centres like Inveraray and Lochgilphead serve as collecting centres for large surrounding areas and are, despite their small size, regional capitals fulfilling a function within their respective localities just as important as say, Oban or Inverness do, with respect to the West Highlands and Islands and the Northern Highlands and Moray Firth coastlands.

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[a] 8 per cent. The repayment of interest and amortisation amounted to £11.3 million in 1961. Before deducting interest and amortisation, 6.7% was earned on net assets (£200m) in 1961, allowing a balance of £1.1 m to be carried forward at the end of the year. It is obvious that both the Board and consumer would greatly benefit if interest rates on borrowing were reduced. It may be added that the Cooper Committee in their Report[223] based many of their calculations on an interest rate of 4%.

If such places were better served with cheap and efficient transport services, not only would there be a better chance of the localities attracting industry but population, both within the centre and the surrounding area, would be more easily maintained. Nevertheless, any improvement in existing services would necessitate an entirely new approach to the problem, an approach concerning making better use of the sea and of the size and type of the vessels to be used.

Most of the craft at present in use are around 200 ft. in length requiring about 14 - 18 of a crew, including catering staff, to operate them. It is obvious that the operating costs of such ships will be high making it essential to carry a fairly high complement of both passengers and freight on each voyage. With such large craft it is equally obvious that the frequency of present services could not easily be economically increased. But with smaller boats, say about 75 ft. in length and carrying a crew of 6 or less, more frequent services could be instituted. An improvement to the former piers - some would have to be rebuilt - of places no longer served by existing services would allow more communities to be served and lead to an increase in both passengers and freight. It is the writer's firm conviction that the number of passengers carried would increase if frequencies were bettered. Further, operating costs would be reduced by the use of smaller boats. Admittedly, smaller craft would not be able to completely supersede large steamers on some of the runs particularly in summer, for they would be unlikely to be able to cope with bulky freight such as cars in sufficient quantity to meet requirements.

Craft of under a 100 ft. in length are already in operation in other countries with coastlines similar to our own and with considerable success. It may be argued that such craft are too small to withstand the rough seas and frequent gales of the west coast. But is this a valid argument? At present, the ships serving west coast ports do not sail when severe gales are blowing, not because of the limitations of the seaworthiness of the ships, but because they find great difficulty in getting alongside piers in rough weather. In some cases ships currently in use must lie outside a harbour in order to discharge - an impossibility when seas are rough. On the other hand, smaller craft would have access to the calmer waters of the inner harbour which

are outwith the reach of larger boats by reason of their larger draft and manoeuvrability. In rough weather smaller craft would normally operate close in shore wherever possible and if full use were made of features like roll stabilisers, sound and seat insulation and modern adjustable seating, there is no reason to suppose that smaller boats would be less safe or less comfortable - indeed, they may be a great deal more comfortable - than those currently in operation.

The writer is aware that in recent years the trunk road (A83T) serving Mid-Argyll and the west has undergone substantial improvement, but all traffic must still cross the 850 ft. Rest-and-be-Thankful and although weather conditions are less severe than in the east of the country, road transport may suffer inconvenience from drifting snow or more commonly from black ice. It may be added that the cost of maintaining road surfaces is greater in the west owing to the prevalence of wet climatic conditions. Further, the present road network particularly in the south and west of Cowal and west of Loch Fyne leaves much to be desired. Not only are roads sometimes discontinuous, for example, there are no roads between Tighnabruaich and Glendaruel or round Loch Striven, but those which do exist are often narrow and limited to a certain weight tonnage. Considering that the sea nearly everywhere bites deeply into the land, is always available and needs no repair and the fact that a cheap and efficient transport system is a prerequisite for industrial development, to say nothing of the expansion of forestry and the growing need to move more and more timber in bulk to certain localities for processing - perhaps to a future pulp mill - it is essential that an efficient system of sea transport in combination with the present road network be devised and developed without more ado. It may be stated here and now, although such is considered in more detail later, that there is a growing need to attract more industry into the region so as to diversify employment sufficiently to meet the requirements of the population.

Further advantages of developing sea transport services are that the majority of people in Mid-Argyll live on the coast and that there is a need to import most industrial materials, apart from perhaps wood, wool and stone. Clay for pottery making is an example. There are strong grounds for believing that Dunoon was chosen for

the new pottery works being run in conjunction with the Strachur crafts centre because of the possibilities for clay being imported directly by sea from the potteries in much the same way as sea transport plays a major role in the dispatch of Cornish Kaolin to Stoke. Supposing the pier at Strachur had been in commission - might not the works have then been established at Strachur?

It is to be hoped that in this all too brief discourse on transport the reader will have been made aware that sea transport can play a vital, and may it be said a decisive part, in any scheme or plan devised to resuscitate and diversify the economy of Mid-Argyll through the introduction of new industry. The writer, has no hesitation in stating it is his firm conviction that although certain disadvantages may remain to industrial enterprise and development, those would be to a very considerable extent offset were a cheap and efficient transport service and network devised and put into commission, particularly now that power supplies are abundantly available. Do not let us forget that as a nation our greatness was founded upon the sea. Equally, do not let us forget that the sea is the natural trading link of the West Highlands of which Mid-Argyll is but part, and that is is only by making much more efficient use of that link than hitherto, that we can ever hope to find an answer to present transport difficulties and deficiencies.

In the last few pages it was argued that despite the availability of electricity, few new industries had developed in the area primarily owing to the fact that any would-be industrialist is faced with the problem of importing raw materials and marketing finished goods by the long and somewhat tortuous route over the Rest and by way of Lochs Long and Lomond, in consequence of the lack of efficient sea transport services. Nevertheless, the fact that electricity is now widely available is a factor of common value and advantage to existing industry and none more so than to the small rural tradesmen scattered throughout the region. Perhaps of greatest value is that electricity allows the purchase of modern, power-driver equipment, which in turn helps to cut costs of production, so allowing repairs which formerly had to be done away to be done away to be carried out locally. This in turn stimulates employment. By making available a mains supply of electricity the Board have thus

helped ensure the future of the country industry - the blacksmith, the agricultural and marine engineer, the joiner, the boat builder, the potter, the stonemason, the quarrymaster - one of the main stays of rural life.

Forest Industries

The greatest industrial project of the post-war era has undoubtedly been the establishment of a Swedish Ari sawmill at Strachur, Loch Fyneside - the only mill of its kind attached to and located in a Scottish forest zone.

In the early fifties need was felt for experiment in the commercial utilisation of small sized softwood logs. The production of mining timber from Scottish woodlands was rapidly becoming sufficient to meet home demand and with the increasing supplies of softwood thinnings coming on to the market, it was becoming increasingly obvious that further development was necessary in the marketing of products from this material. Hitherto, most small size thinnings had been made into pit props and sawn mining timber, the latter being prepared by a mobile mill, familiarly known as the "Scotch Bench", although in cases where woodlands were conveniently situated, the thinnings were transferred to fixed mills where they were converted by precision sawing into materials for the boxboard and building markets. Such mills were normally located where there was a market demand for this kind of material or at ports where additional supplies of imported timber could be readily handled.

The increasing supplies of soft wood thinnings being produced from the earlier state forests in Mid-Argyll and particularly in Cowal, presented an opportunity for testing new markets for thinnings by experimenting with the precision sawing of comparatively small sized logs followed by the seasoning of the wood in large kilns. Considerable thought was given to the type of mill which would be most suitable for this purpose and finally it was decided that as special attention and research had been carried out in Sweden in the technique of handling and sawing small sized logs, a Swedish Ari mill should be erected. Next, location had to be decided - the choice being between a large sawmill in an industrial area with plentiful labour supply but far from the source of raw material, and a comparatively small unit within the forest area. After considerable deliberation it was decided to adopt the latter, not only

by reason of it being considered preferable to erect the mill close to the source of raw material, but because of the stimulous which would be given to the local economy by the construction and operation of such a project. It was also considered that the erection and successful operation of such a mill would help pave the way for future forest industries - a desirable concomitant to state afforestation. A site was chosen in Strachur so that the mill, at least initially, could readily draw on supplies of raw material from forests west of Loch Fyne, in addition to those from forests in Cowal. Great support for the project was given by Argyll County Council, the Scottish Council and the North of Scotland Hydro-Electric Board.

The Cowal Ari Sawmill

A company known as the Cowal Ari Saw Milling Company Ltd.[a] was formed in July, 1953, to finance the project, the finances being provided jointly by the Forestry Commission, who were specially interested in new ways being found to utilise the growing volume of thinnings, and Messrs. Adam Wilson and Sons Ltd. of Troon, Ayrshire, a firm of timber merchants who, for a number of years, had been engaged in the extraction of thinnings from state plantations in Mid-Argyll. The Commission's financial interest in the company is in the form of a debenture holding. Building began in October, 1953, on a site feued from the Commission near the River Cur, about half a mile south-east of the village of Strachur. Installation included an Ari sawmill unit and a kiln of modern design large enough to season 50% of the expected production of the mill. The mill is equipped entirely with circular saws, the timber being conveyed mechanically through three saw units known as the slabbing saw, the re-saw and the edger powered by electricity.[b] Of particular interest is that the seasoning kiln is heated by steam generated in a boiler fired with sawmill waste, so enabling a partial solution to be found to the problem of getting rid of waste products.

By 1960, the Commission had sold about 1 million cu. ft. of round timber to the mill of which nearly one-half was supplied by forests outwith the Cowal area, mainly from Inverliever and as far north as Barcaldine and Ballachulish. This is as expected but latterly, it has been pleasing to note that the proportion of timber from

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[a] The Company's head office is at 90 Mitchell Street, Glasgow C.1.

Cowal forests has been increasing although it may yet be some time before the requirements of the mill are drawn from the Cowal district alone.

One may well inquire as to what use the output of the mill is put. Much of the timber is sold for case and crate making for which there is a large demand while increasing quantities are being absorbed by the building industry. Sales cover a wide area, mainly from the Central Lowlands to the English Midlands, with a drive to extend markets to the London area and South of England. Distribution to consumers is carried through mainly by the Company's own transport while an additional fleet of vehicles is used to deliver logs to the mill from the forests. The superior quality of the sawing and seasoning treatment together with the fact that the Company only accept logs of a certain specification, have been found to be factors of paramount importance in finding markets for the finished product. They have also allowed the Company's timber to command prices above the normal level for home grown timber and yet to compete most favourably in both price and quality with the best quality imported Scandinavian timber. Certain difficulties were encountered in selling but these are now felt to have been largely overcome as more and more consumers come to realise that home produced timber can compare favourably in quality with imported brands and yet sell at a cheaper price.

About 30 people including staff are employed at the mill. Following the decision to erect the mill at Strachur, Argyll County Council decided to erect 60 Council houses in the village of which 30 were allocated to mill workers and staff. However, this is no longer so today, primarily for two reasons.

(1) Retired or other people who have left employment with the mill have been allowed to stay on.

(2) Skilled sawyers and a proportion of other staff and workers have not readily accepted the relative isolation of Strachur and instead prefer to reside in Dunoon and travel daily by car and bus. For the same reason frequent changes in staff have occurred. While a proportion of the workers are local, a high percentage of staff and skilled workers have been recruited from the Lowlands, notably Ayrshire.

Problems also remain regarding the disposal of the growing volume of sawmill waste which is partially solved by burning and in the drying kiln. Perhaps if some

method could be found of producing briquettes, either from sawdust in admixture with small wood particles and shavings or from sawdust alone, a solution could once and for all be found in meeting this problem. There is little doubt that they would find a ready market locally. There would also seem need to improve existing storage facilities at the mill so that both an adequate reserve of round logs and sawn and dried timber may be built up to meet fluctuating seasonal market demand.

Despite these difficulties the whole project is highly commendable and must be said to have justified the efforts of its progenitors. Further, both the Commission and Messrs. Adam Wilson and Sons Ltd. must be complimented on having carried through a development which is in a sense a blueprint for future forest industries.[a]

Forest Enterprises Limited

A sawmilling business known as Forest Enterprises Ltd.[200] and which is really a subsidiary of the Cowal Ari Mill at Strachur, was established at Cairnbaan in September, 1959, by Messrs. Adam Wilson and Sons Ltd. The mill, which is located on land within the Commission's camp site at Cairnbaan and close by the Crinan Canal, was founded on an experimental basis to establish whether or not it is best to centralise such a mill - Cairnbaan is well placed to draw timber from a considerable number of forests - or to have travelling mills which can operate in different forests. Although mining timber forms the main production of the mill it was somewhat surprising to learn that the recent contraction in coal mining had affected them little, the suggested reasons being that wood had an inherent advantage over its great rivals steel and concrete in mining operations in that it had spring and thus was more suitable and less dangerous during blasting operations, and consequently, demand for timber had been little affected. Most of the raw material for the mill is at present drawn from Knapdale, Minard and the Loch Awe group of forests, namely, Inverliever, Eredine and Inverinan. In 1960, output from the mill was running at nearly 150,000 cu.ft. per annum, with the expectation that this figure would soon be increased to 200,000 cu.ft.

Apart from key men all labour employed is local, mainly from Lochgilphead. In 1960, 20 men were employed and although difficulties have been experienced with regard to labour recruitment, the Company have had less difficulty than the Commission on

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[a] Photographs 196 - 199 refer to the Cowal Ari Mill.

account of the higher wages paid.

At time of calling (1960) the firm were busily engaged in negotiations with the Commission regarding establishing guarantees for future timber supplies. To date the mill has not been long enough in commission for the Company to pass any final comment as to its future although the impression gathered was that, so far at least, it had proved eminently successful. Undoubtedly, its presence has provided a ready market for timber from Knapdale and adjacent forests.

It was interesting to learn that although Darling[a] may have had the Crinan Canal in mind as a cheap means of transport when advocating the use of the Knapdales for forestry, the canal does in fact play no part in the movement of timber for the firm, seemingly because canal charges are out of all proportion to its length. As a result the firm depends entirely on road haulage.

While the advantages of afforestation in helping to arrest rural depopulation and and in the provision of employment cannot be denied, full advantage can only be gained through the establishment and expansion of industries connected with forestry. This would not only lead to more timber production but would put Scottish forestry on a par with that on the Continent. Currently, there are plans for the setting up of a large pulp mill at Annat near Fort William. The mill, which is expected to provide work for 1200 people, is expected to come into production about the end of 1965. It will not only be of enormous benefit to the immediate area but is expected to draw on wood supplies from a wide area including Mid-Argyll. If such does come to fruition, is there not a strong case here for sending timber from Mid-Argyll by sea in view of the docking facilities to be had at Fort William - the deep water berth at Fort William was given as a reason why this particular site was chosen - rather than by the long and circuituous route by road? A possible alternative would be to use the rail facilities from Arrochar but this would involve shuttling all supplies by road to the extreme north-east corner of the region, unless, of course, use was made of the sea approaches to Loch Long. It may follow at some future date that a second

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[a] Page 449.

pulp mill will be established in Mid-Argyll. Inveraray or Lochgilphead would appear to be the most convenient sites for such a project. Both, however, have certain inherent advantages, the former on grounds of amenity - much of the burgh has recently been renovated by the National Trust - and the latter on account of its rather poor sea appraoches (shallow water) although such could easily be overcome by acquiring a site at nearby Ardrishaig which has an excellent pier.

The reader may recall that in a recent survey[a] carried out as to the feasibility and economy of establishing small scale pulp mills in Scotland to absorb the increased quantities of thinnings which are expected to become available in the future, it was suggested that a bleached sulphate mill with a capacity of 50 - 100 tons per day and an annual requirement of 39,000 - 78,000 tons of timber would be the most economic unit and that Lochgilphead was listed as being one of the four most suitable sites for the location of such a project. When one realises, however, despite the fact the volume of thinnings is rapidly growing from year to year, that the total output from all the forests in Argyll, in 1961, was in the nature of 50,000 tons - at least two-thirds of this is estimated to have been produced in Mid-Argyll - one begins to appreciate that some years may have to lapse before it would become economic to site such a mill in the region. To do so now would raise the same difficulties as recently experienced at the Cowal Ari Mill, namely, the need to bring timber from considerable distances in order to satisfy demand.

While the establishment of such large industries would undoubtedly contribute greatly to the economy of the region it may be that in the immediate future its well-being may rest on the establishment of a number of small scattered undertakings comparable in size to the saw mill at Cairnbaan and certainly no larger than the Cowal Ari Mill at Strachur, rather than on one or two large undertakings established in the bigger centres of population. In this way the full benefits to be gained from forestry and forest industry would be more evenly distributed. Possible sites for the establishment of such industries, in addition to Cairnbaan and Strachur, are Ardentinny, Arrochar, Dalavich, Ford, Glendaruel, Kilmun, Lochgilphead, Lochgoilhead,

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[a] Page 112.

and Minard.

In private woodlands, although timber may also be supplied in quantity to the types of industry just described, there would seem grounds for advocating the establishment of wood using industries like those already described under the Beauly Basin,[a] namely, for a variety of uses both locally and further afield, like fencing, tractor trailers, sheds, etc. The wider use of timber for fencing would provide an enormous market for the timber industry and as aforesaid, the cost of a wooden fence need be no greater than that of a wire fence of comparable height. To add variety, pressure plants for celcuring[b] timber could be established at selected points both by private woodland owners and the timber trade.

Undoubtedly, the making of wooden ornaments and trinkets could offer a limited but interesting outlet for local timber although it is appreciated that certain varieties of wood may have to be imported. This is a type of industry in which Scotland has always sadly lagged in comparison with her Continental neighbours and deserves encouragement. Mention has already been made of the Strachur craft centre. More recently, plans have been set afoot to establish a Highland craft centre in the 18th Century Inverarayc ourt-house. At time of writing, an offer has been made by Highland Industries Ltd. to buy the building with a view to beginning the training of young people in woodwork, metalwork, jewellery and weaving in the summer of 1963. The idea behind the proposed venture is to get young people to take up such work and by putting the crafts on a commercial basis, to show that a good living can be made from full-time employment in the craft industry. While Highland Industries Ltd. have fourteen shops in Scotland selling craft goods and have intimated that they will take the entire output of such a centre so that there ought to be no difficulty in selling the goods, the writer has his doubts as to whether sufficient young people will be found who are interested in and willing to follow this line of employment. Nevertheless, it is commendable that a centre of this sort has been proposed for Mid-Argyll and one can only live in hope that the venture will meet with the success it undoubtedly deserves.

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[a] Page 242.

Two other wood using industries, established in the area may be mentioned. At Strachur, an old established (1823) local timber firm, A. Ferguson and Company Ltd., has branched out to produce timber houses known as "Argyll bungalows", and for which there is a growing demand. The following boat-building yards are also in production.

(1) A small but efficient boat and yacht building yard at Tighnabruaich.

(2) Two internationally renowned boat-building yards and one smaller yard at Sandbank on the Holy Loch. A sheltered bay (Arnadam Bay) giving good launching and anchorage facilities, proximity to the great ship-building centres on the Clyde and ample room for extension along the 25 ft. beach, are all factors which contributed to the rise of the industry in 1876. Private yachts and launches have for long been a speciality and markets are now world-wide, particularly the United States. Demandfor pleasure craft in recent years has been booming as boating and yachting have gained in public favour. Over 100 men are employed.

(3) Recently, a small boat-building firm has been established at Dunoon.

(4) A small boat-building yard exists at Gairletter, about two miles south of Ardentinny.

(5) Recently (1962), the writer learned of plans to set up a boat-building yard at Crinan which would seem an ideal location. The aim is to cater primarily for the boating enthusiast, for each year scores of privately owned yachts and cabin cruisers pass through the canal, many to anchor for a time in Loch Crinan.

While most of the timber used by reason of type - mahogany, red pine, etc. - must continue to be imported from abroad, it may be that more use could be made of Scottish grown timber, for example, larch. Perhaps, as at Faskally,[a] timber could be acquired from elsewhere in Scotland if local grown supplies are found to be unsuitable Yet, whether or not home supplies ever feature to any significant degree in the industry there would seem great possibility of further expansion in the industry in Mid-Argyll, by reason of the increasing popularity of both boating and yachting - a growing number of craft are now being hired on long and short term contract - and the many possible sites which the region has to offer.

Enough has been written not only to indicate the tremendous possibilities offered by large scale afforestation towards the establishment of wood using and wood processing

industries, but that already a successful start has been made towards bringing such industries into being, as at Strachur and Cairnbaan. As in both Beauly and Tummel, the injection of a younger element into the population consequent on hydro-electric and forestry development, has increased the need to provide more jobs of a miscellaneous type within the region. As cited under an examination of conditions at Arrochar/ Tarbet in the previous chapter, young men and women are continuing to drift away, largely by reason of the fact that there is insufficient employment of the right type locally to keep them at home. Further employment with the Hydro Board is virtually non-existent while state forestry seems to offer little incentive to the young for a variety of reasons. Unemployment among insured employees was 3.5%[a] in June 1960, but this does not give a true indication of the position for there is much seasonal unemployment, particularly in winter. It is obvious that were it not for the drift of young people away from the area, the rate of unemployment would be very much higher. This is, of course, a problem common to much of Scotland, but it is the writer's experience that while it is human nature for a proportion of the population to move away from the remoter parts of the country of which Mid-Argyll is one, the drift can be reduced to a minimum if only better opportunities in the form of enough jobs of the right type and incentive are provided locally.[b] At present, over the greater part of the area with the exception of the burghs and Clyde coast, there is little in the way of alternative employment to agriculture and forestry, although perhaps within the next decade or two this monopoly may be broken for the new forests and abundant power augur well for the establishment of forest industries, including boat building, on a scale much greater than hitherto. In this respect it would be of advantage if the new industries so formed could be persuaded to employ local people rather than rely heavily on the importation of outside labour. Perhaps the Commission could provide a lead, either wholly or jointly, in the establishment and

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a This is an average for the Dunoon and Lochgilphead Employment Exchange Areas. The individual exchange figures were, Dunoon - 4.3%; Lochgilphead - 2.8%.

b Experience is based on discussion with local people.

operation of forest industries, as was done in the case of the Cowal Ari Mill. Equally so, more Government aid in the form of financial inducement is required to attract small scale private industry of a miscellaneous type, while greater encouragement could be given to local people to commence a business in the form of grants or loans at low rates of interest. The initiative is there: what is neededare the means to put it into practice.

FIG. 94 MID-ARGYLL - SURVEY OF MINARD, AUGUST 1951

The undernoted is based on information obtained in a survey of the village of Minard (also known as Auchgoyle) on the west shore of Loch Fyne about 10 miles south of Inveraray, undertaken by the Town and Country Planning Department of the County of Argyll.

Total Population	138		
Working Population	51	-	37% of the total population
Children under 15	22	-	16% of the total population
Not gainfully occupied	- 65	-	47% of the total population

List of Occupations in Minard

Males

Butler	1
Caterer	1
Contracting Agent	1
Farmers	2
Farm Labourer	1
Forestry	14
Gamekeeper	1
Grocer	1
Handyman	1
Joiners	3
Insurance Agent	1
Labourers	3
Lorry Driver	1
Merchant	1
Postman	1
Tractor Driver	1
	34

Forestry	6
Housekeeper	2
Housemaids	3
Nurse	1
School Cleaner	1
Shop Assistants	2
Teachers	2
	17

Percentage of males employed in forestry - 41%

Percentage of females employes in forestry - 35%

Percentage of working population employed in forestry - 39%

Note: Since the date of survey, a small Council housing scheme - some Forestry Commission workers are housed there - has been erected behind the existing village. The quarry at Crarae, about 1½ miles distant, has been re-opened and many of the workers are housed at Minard. While the population may in consequence be greater now (1960) than in 1951, the number of resident forest workers has declined to 11 (10 males and 1 female) - primarily due to the present stage in the growth of the forest - this representing about one-half of the present Commission labour force in Minard Forest. The total forest population in the village in 1960 was 24 (21 adults and 3 children).

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196-199. Cowal Ari Sawmill, Strachur.
Phot. 196. - Stacked thinnings.
197. - Transporting sawn timber.
198. - Stacked sawn timber. The ride serving Balliemore Farm (Phot. 179) is shown on the hill opposite.
199. - At the far end of the yard is a Wells Kiln of modern design for seasoning timber.

200. Sawmill (Forest Enterprises Ltd.), Cairnbaan, Knapdale.

CONCLUSION

Whatever shortcomings there may have been one cannot but be impressed by the changes wrought in Mid-Argyll since 1945 by the construction of the schemes of the North of Scotland Hydro-Electric Board which have been the means by which electricity has now been brought to all but a scattering of habitations, and in the course of half a century of state afforestation. To the passing tourist much of the region, particularly Cowal, Loch Fyneside, Loch Aweside and Knapdale, may indeed by popularly designated the "Land of the Trees".

The hydro-electric schemes by reason of their small scale and location are less evident than in either the Tummel valley or the tributary glens of the River Beauly, consequently, at time of promotion there was considerably less opposition to their construction on grounds of amenity, fisheries and disturbance to local land use, than in the other regions of study. Nevertheless, there is abundant evidence that the Board have in general carried through their schemes with infinite care and with the minimum of disturbance to local interests. Some losses were inevitable through the flooding of bottom land and loss of ease of access to grazings but these have proved to be rather in terms of acreage than in the reduction of stock. Losses in land have been offset, in part at least, by river control consequent on dam construction, so allowing more intensive use of land adjoining the river bank. Probably most advantageous of all will be the reduction in the frequency and incidence in the flooding of the River Add which ought to follow the completion of the Board's Glashan scheme.

Compensatory flows to the general satisfaction of local proprietors have been maintained in the larger streams noted for trout and salmon fishings. It may be added, however, that although regarded as sufficient, the flows are by no means generous but owing to the short time the schemes have been in operation, it is still too early to pass any final opinion as to their long term effects on fishings. Cordial relations exist between the Board and local fishing interests and it was pleasing to note that there is little, if any, of the antagonism encountered in the other two regions of study.

While exception may be taken on amenity grounds to the harsh outline of the

pipes which convey water to the power station at Inverglas (Sloy), there is no evidence that the presence of the scheme has in anyway detracted from the tourist potential of the district. Instead, all the schemes, together with their access roads to the dam sites, have proved added attractions to tourists, proving the Cooper Committee's dictum that hydro-electric schemes in the Highlands could be an advantage rather than a hindrance to the development of tourism.

The past 50 years, and notably since the late war, have witnessed the steady encroachment of forestry into an area which, in the previous century, had been turned over almost in its entirety to the grazing of hill sheep. While one has no wish to decry hill sheep farming as such, the hard facts remain that this large scale conversion to sheep farming was neither compatible with the retention of the human population nor the fertility and intensive use of the soil. Forestry offers an alternative not necessarily a replacement - except where by necessity stock must be cleared from land earmarked for planting - to sheep farming and offers a solution to the very great problem of right land use in Mid-Argyll. Ultimate success will depend upon their successful integration for it is known that while forestry reduces the area available for grazing, the shelter provided by carefully sited blocks of trees, allows more stock to be carried on the remaining agricultural land. The net result is an overall intensification in land use.

In theory finding a solution to the problem of land use seems relatively straight forward but in practice can be exceedingly intricate. Consequent on the depressed state of hill farming pre-war, there is evidence that in a number of instances, notably in Knapdale and Cowal, much land was planted which by present standards would have been retained under agricultural use. Afforestation was in the main done in large blocks so that over wide areas there are today continuous stands of timber. With improvement in the fortunes of hill farming since the war, it is only natural that many farmers should express bitterness that the Commission should have been allowed to plant such large acreages. However, could anyone have foreseen the changes in the economics of the hill farming industry? Although one's sympathies must lie with the sheep farmer who finds himself unable to increase his number of stock due to the

fact that he no longer has the available land, one must bear in mind that when such land was acquired by the Commission it was so seriously understocked in most instances that its direction to afforestation was undoubtedly a positive step to bring such land back into production. Judged objectively there can be no doubt that overall this was the correct policy to adopt. Unfortunately, where it fell down was that in certain instances - two examples were cited in Knapdale - farms directed to be retained under agriculture were not left sufficient land to continue functioning as economic units - at least in their former capacity, while in areas of high relief where forestry was limited to a relatively narrow strip along the lower slopes, insufficient care was taken to provide enough rides of suitable width through the forest to furnish ease of access for stock to the hill grazings above so that they might be fully utilised.

Following the passing of the Forestry Act (1945) and a change in the fortunes of hill farming since the war, the Commission found themselves more restricted in acquiring land for planting. This may not seem apparent when one recalls the large acreages planted in the years immediately following the war but we ought to remember that this was largely in consequence of the hold up in planting during the war and the many new acquisitions made after the cessation of hostilities. A notable result is that the Commission have been more willing to plant smaller blocks. Whether or not this has been to the Commission's advantage is a doubtful question. Nevertheless, a positive result has been the establishment of better relations between the Commission and agriculturalists in the newer acquisitions - a contrast to the deep-seated mistrust which still persists in many of the earlier forests.

To safeguard amenity the Commission have retained or planted hardwoods on occasion along roadside verges but generally, there is little to break what is so often termed the "monotony" of the straight edges and green swards of coniferous plantations. While one's views must always largely be coloured by one's own personal tastes, the writer cannot state that he found the predominance of spruce or larch or the straight edges of the forest blocks particularly disconcerting.

It was pleasing to record the relatively great importance of private forestry in Mid-Argyll and the large acreage of woodland under approved schemes of woodland

management. On private estates there is evidence that forestry and farming are being developed as complementary land uses.

There can be no doubt that hydro-electricity and forestry have advanced the prospect of retaining population in Mid-Argyll. While the hydro schemes are responsible for a permanent contribution of 150 people to the area, their greatest value lies assuredly in the wide availability and domestic use of electricity and the effect this has had in helping to stem population drift. On the other hand, forestry undoubtedly offers the best prospect for repopulation. Already state forestry has brought people back to areas which previously had experienced decades of declining population, a notable example being provided by Loch Aweside, where the population within the area now designated Inverliever Forest is now over five times what it was prior to planting. In terms of number the figures are significant, about 500 people being employed and over 1700 being supported directly by state forestry in Mid-Argyll.

Socially, forestry has proved less successful. Labour turnover is high in many localities, particularly in forest villages and in the west. The Commission is perturbed about the magnitude of this problem which stems largely from the need to recruit much forest labour from outside. Outside recruitment is mainly from the industrial Lowlands which, by reason of the low basic wage paid to forest-workers, is generally of a class unsuited to forest work and life in a rural community. Yet despite the many difficulties, it is estimated that even where labour turnover is high, about one family in three has been won over to forestry. They alone are a permanent addition to the population of the Highlands. It is paradoxical that while much has been done to provide comfortable houses and halls where recreational activities may be held so as to make the transition from town to rural life easier for forest employees, little effort has been made to raise basic forest workers' wages to a level which would both act as a stimulant to recruitment and in attracting a better type of worker who could make better use of the facilities provided.

In terms of population the value of private forestry lies primarily in absorbing surplus agricultural labour which otherwise may have drifted from the area and in providing a means by which estate labour may be more efficiently employed. Nearly

all private forest employees are recruited locally.

Electricity cannot be said to have brought any new industry to the region although its availability has undoubtedly been of benefit to existing industry and particularly to rural tradesmen. However, forestry offers prospects for the establishment of forest industries and it was pleasing to note that the first of these industries in Mid-Argyll, and incidentally the first of its kind in Scotland, namely, the Cowal Ari Mill, had proved eminently successful. Fired by the success of this venture and the growing volume of timber being produced from local forests, there seems little doubt that other forest industries will become established in the future. A number of probable sites were listed.

Forest industries apart, local geographical considerations would seem rather weighted against industrial development unless the following proposals become operative. Firstly, there is a real need for study the future industrial and employment requirements of the region - with the growth of population following forest expansion such a need is of paramount importance - to decide what types of industry ought to be encouraged. Consideration might also be given as to how best the tourist potential may be further developed. The Argyll National Forest Park has already proved eminently successful as a tourist attraction showing that the development of forestry need not be incompatible with tourism. Secondly, a study should be made of how best, including financial inducement, industry may be encouraged to develop in the region. Thirdly, transport communications must be improved. This would entail making much better and wider use of the sea as the natural communication link. At present, for example, much of Cowal is an industrial backwater owing to the paucity of communications. It is envisaged that road and sea transport could be integrated, with the help of more frequent and additional ferry services together with the use of smaller craft, better equipped but cheaper to operate, than those at present in commission on the longer runs, into a first class communication system. It is obvious that to follow through such a plan lies far outwith the power of the local authority. Only Government action through the intermediary of a development authority would have th necessary means to implement such a plan of action. The Forestry Commission and The North of Scotland Hydro.

Electric Board have each in their own field created great prospects which, if they are to be realised to their full advantage, must be followed through together with other considerations for the economic and social betterment of the region, by a coordinating body equipped with the necessary powers and means.

SUMMARY OF FINDINGS

SUMMARY OF FINDINGS

SECTION I.

Before embarking on the main study of the thesis it was considered necessary to present a brief review of the Highland problem, firstly, in a general sense, and secondly, with particular reference to each of the regions of study.

What is popularly termed the Highland problem is a problem which to a varying degree is common to many rural areas, but is even more critical in the Higlands by reason of peculiarities of history and relief. The preceding two centuries have witnessed the misuse of a people, culture and terrain largely, though not entirely, due to outside influences, while relief and to a lesser extent climate, have placed limitations on the potential of the area as a habitat for man. Socially, the problem is characterised by a decline in the number of the population and an ageing of the population structure. In many districts this process has been marked by the abandon-:ment of scores of former habitations - thegreen sward on the hillside and a scattering of stones all but covered by moss or bracken, marking the site of some long forgotten dwelling - and a noticeable increase in the proportion of middle-aged and elderly people within the population. In course of time the number of people becomes so small that the maintenance of public services, poor though these may already be, becomes no longer justifiable.

Economically, living standards, particularly in monetary terms, are below the average for the rest of the country. Employment is practically dependent on agri-:culture - mainly the rearing of hill sheep and crofting - with a little fishing, weaving, forestry and catering for tourists. Poor public services, including trans-:port and communications, paucity of resources and raw materials, low population density and distance from markets, preclude the type of industrial development which would lend variety to employment. This in turn helps to promote further emigration of the younger and more virile elements of the population and so the process of decay continues. Is it little wonder that the Highlands have for long been regarded by the rest of Britain, as a source of man power, both in war and peace!

The regional studies were found to epitomise the problem and its attendant diffi-:culties to a varying degree. It was noted that decay, particularly in terms of population number, had proceeded furthest in the remoter parts of Mid-Argyll where, by 1931, some parishes had less than one-quarter of their maximum population, by reason primarily of their wholesale conversion to sheep farming in the late 18th and early 19th centuries and more recently, the late 19th and early 20th century decline in the fortunes of that industry. By contrast, the Clyde coastal area of Cowal and the Dunbartonshire parish of Arrochar, on account of wider diversity in employment, better living standards and relative ease of access to the Lowlands, experienced an increase in population - the only areas in all three regions to do so. For similar reasons burgh populations had generally grown at the expense of landward areas.

From the time of publication of the Napier Commission's Report in 1884, the con-:science of the country has been increasingly stirred by many writings and reports on Highland conditions, consequently, there has been increasing awareness of the res-:ponsibility of the rest of the country towards the future well-being of the region and much official attention has been given to the search for alternative solutions to alleviating present problems. It was with this in mind that the Government appointed the Cooper Committee to consider and report on the practicability of harnessing the water resources of the Highlands, and following the publication of their findings, Parliament was asked and readily gave sanction to the recommendations embodied in the Report. The outcome was the passing of the 1943 Hydro-Electric Development (Scotland) Act and the bringing into commission of the North of Scotland Hydro-Electric Board to plan and carry through the development of Highland water power. Some twenty-four years previously, following the recommendations of the Acland Committee and the passing of the Forestry Act (1919), a body known as the Forestry Commission was brought into being and given the necessary powers to carry through the task of replenishing our home-grown timber reserves. Although the Commission, unlike the Hydro Board, is an authority whose powers extend the length and breadth of Britain, they have since assumed a rather special role in the programme of Highland development owing to the large reserve of plantable land within the region.

More recently, following the appointment of an advisory committee to review post-war forest policy and the publication of two Command Papers dealing with the separate requirements of state and private forestry respectively, Government aid has been made available in increasing quantities to the private woodland owner since 1948. Of particular interest were the introduction of various schemes - the best known is a "Dedication of Woodlands" scheme - to establish better management control over private woodlands. Under these schemes, in addition to eligibility for financial aid, advice is freely available from officers of the Forestry Commission. Subsequent revision of Government forest policy followed in 1957 and since 1959; Government aid to private forestry has been substantially increased. From October, 1959, developments in private forestry and the views of private woodland owners have been integrated by the formation of a body known as the Scottish Woodland Owners' Association, which has since proved to be an active voice in forest affairs and policy.

SECTION II

The feasibility of generating power from Highland streams providing that adequate storage facilities can be implemented, has long been recognised. By reason of their stepped profile, their many lochs and the heavy rainfall of the neighbouring hills which ensures a constant water supply, both the Beauly and Tummel river systems are well endowed with the necessary prerequisites for hydro-electric development. In consequence, the basins include some of the largest hydro-electric developments in the Highlands, the water in some cases being used many times over to produce power. By contrast, there are no large river systems in Mid-Argyll and consequently, the success-:ful generation of hydro-electric power was dependent upon the extension of catchments by the diversion of water in aqueducts and tunnels from neighbouring river basins. The Sloy scheme provides the supreme example, the original catchment of the loch having been extended to about five times its former area by the adoption of this principle.

Despite the early recognition of the suitability of the Highlands for hydro-electric development, few schemes were commissioned prior to 1945, a notable contrast to countries of similar relief, such as Norway and Sweden. Opposition to hydro-electric development in this country was provided by great vested interests such as

coal mine-owners, landowners and sporting interests, and by the fact that, more often than not, the most suitable areas for development impinged on areas of great scenic value. Again, there were fears for the consequent effects to agriculture by the inundation of bottom land through damming, while the resulting changes in river flows were considered to be detrimental to fishings, to say nothing of the dams which, it was feared, would create insurmountable barriers to the free passage of migratory fish such as the salmon.

Although forestry was considered to eventually have certain, though rather in-:determinate, effects on amenity and run-off - the latter is of particular interest with regard to river flows, fisheries and hydro-electric generation - the greatest opposition to tree planting was provided by hill farming interests. Opposition may be classed as arising, firstly, through local prejudice against and suspicion of forestry as a land use in upland areas, and secondly, and perhaps most pertinent, through fear for the future of hill farming - particularly hill sheep - and the con-:sequent effects this would have on the wool and mutton industries of the nation as a whole, by reason of the fact that hill sheep are the breeding and rearing stock for Lowland farms, in other words, the basis of the home sheep industry.

Whatever one's views today, there can be little doubt that many of the fears ex-pressed initially against hydro-electric and forest development were genuine. In consequence, both the Board and the Commission were faced with problems additional to those directly related to hydro-electric generation and tree-planting. Faced with these difficulties, how far has it been possible to resolve the seemingly conflicting interests and requirements of hydro-electric generation and forestry with existing land uses and interests?

Amenity

The most obvious changes following from hydro and forest development are those wrought on the physical landscape and consequently, the initial proposals to "hydro-electrocute" Glens Affric (pre-war) and Strathfarrar and the lower reaches of the Tummel and Garry Valleys, especially in the vicinity of Pitlochry, were viewed with considerable public concern. Indeed, so great was the outcry, particularly in

Perthshire, that the Secretary of State was obliged to exercise his prerogative and sanction the holding of public inquiries into the schemes to resolve conflicting claims. In the 1943 Act it is determined that the ultimate test of any scheme is whether or not it is in the public interest to carry it out, and again, that the Board is enjoined in the exercise of its functions to have regard to the desirability of preserving the beauty of the local area. In each of the developments under consideration, no evidence was provided that electricity could be produced and the local area given a main's supply economically by any other means, consequently, the Board were in each case, subject to certain reservations, given powers to proceed with their schemes. And the result? The completed works are widely recognised to have, in many cases, not only preserved but enhanced the local scene, while the new or reconstructed roads to the dam sites and by the shores of the new or enlarged reservoirs, to say nothing of the attractions of the works themselves, have proved popular diversions to tourists. Further, the use of attractive stone for the facing and building of power stations and houses for permanent staff are a testimony to the Board's due regard to local amenity.

Particularly commendable are the finished works in Glen Affric, at Loch Tummel and in the neighbourhood of Pitlochry, and in Glen Shira and at the Glashan Power Station in Argyll. Less attractive are the various switching stations, where it is felt more could have been done to plant such sites with trees and shrubs, the pipes at Sloy, the now dry course of the Garry and the diminished flows over the Falls of Bruar and Tummel. However, with these possible exceptions, one cannot but conclude that the North of Scotland Hydro-Electric Board deserve to be complimented on having carried through their works in each of the areas under review in a tradition which has both helped to preserve and enhance the scenic amenities of the respective districts.

Unlike the construction of edifices in stone and concrete such as dams and power stations, tree planting is generally held in the public mind to be much more compatible with the preservation of amenity. Nevertheless, the siting, shape and density of plantations and the type(s) of species selected, may have considerable effects on the local scene, and consequently, the Commission's acquisitions, plans

and planting proposals, are kept under close scrutiny by various trusts and societies, notably the National Trust, whose aim is the preservation of all that is best in our rural landscape. Of special interest is the adoption by the Commission of a special forest policy for areas which incorporate the preservation of much valuable acquired woodland so as to retain the natural characteristics of the locality. The famous Black Wood of Rannoch and Glen Affric, both of which contain valuable stands of Old Caledonian Pine Forest, are being treated so that their woodlands may be retained for the enjoyment of future generations.

Where it has been deemed practicable and necessary to do so, mixed planting, including hardwoods, has been embarked upon, mainly along roadside verges, so relieving the "monotony" of the dark green swards of the conifers. However, in fairness to the Commission, it must be emphasised that local ground conditions and economics are heavily weighted against the widespread adoption of this principle.

Fish Stocks and Fishings

As with amenity, the proposals to abstract water from certain river courses in the Beauly and Tummel basins to meet hydro-electric requirements, met with considerable opposition from fishing interests and may be contrasted with conditions in Mid-Argyll where the absence of any large rivers of widely recognised angling esteem, made fisheries a relatively minor issue. In general, where flows have been considerably reduced or are subject to daily fluctuations in volume consequential on the varying requirements of turbine operation, these have proved detrimental to river fishings though not necessarily to fish life, as in all rivers of any consequence, with the exception of the River Garvy, the Board are required to maintain flows above a certain minimum, these figures having been determined through agreement with local interests after considerable discussion and study of local requirements. Undoubtedly, the most serious loss was the dewatering of the River Garry - a major spawning stream - which is considered to be primarily responsible for the apparent decrease in the number of migratory fish using the Pitlochry Fish Pass. Where flows are now more regular, as on the Glass/Beauly, angling has noticeably improved.

In course of study it was found that to make any accurate assessment at present of the effects of hydro schemes on the rivers in question was exceedingly difficult for a number of reasons.

(1) Firstly, most schemes have been in operation for only a relatively short space of time and since there are so many variable factors, for example, weather, which have considerable effects on fish life, it is in the main too early to pass any final conclusions as only long term effects can be related to the schemes with any real degree of accuracy.

(2) Few reliable statistics are available - indeed, much secrecy surrounds returns from certain interests - as to fish stocks, catches and movement, prior to hydro development, with which present figures, as are available, may be compared.

(3) There is much contradictory evidence as to the effects of the schemes, partly due to ignorance and coloured, no doubt, by whether one has vested interests at stake or is for or against the Board.

One can with confidence, however, relate that while there is enough evidence to show that certain fishings, particularly on the Tummel/Garry, have suffered diminution as a result of hydro development, so much is being done at present by the Board to protect fisheries and to make good, if practicable, any losses caused or thought to have been caused by their schemes, that fishings cannot yet be considered to have been permanently ruined anywhere except in a few obvious cases like the Garry. Steps taken by the Board to ensure the protection of fisheries include.

(1) The construction and maintenance of fish ladders and fish counters to ensure as far as possible the free access and egress of migratory fish and a scientific record of fish stocks.

(2) Compensation flows and the discharge of freshets at certain times to meet fish requirements.

(3) The restocking of major rivers, tributaries and lochs with eyed ova and fry.

(4) Experiments to find new spawning grounds to replace beds lost through reduction in flows and inundation. The most notable example is the scheme to adapt the Errochty in place of the now dry Garry.

(5) Generous offers of cash to local fishery boards and interests to improve fishings, as on the Tummel/Tay and Fyne.

(6) The prominent interest taken by the Board in all matters pertaining to salmon and brown trout research.

One may thereby conclude that while hydro schemes may have in certain instances seriously upset or curtailed river fishings, considerable effort is being made to offset any losses which may have resulted. The maintenance of fish stocks and fishings, particularly on the Tummel/Tay, is of vital importance to the local economy both in monetary terms and as a means of employment, and it is commendable that while the Board's job is first and foremost the provision of electric power, great care is being manifest for the protection of those other interests whose future is also so largely dependent on the water resources of the Highlands.

Despite the expansion of forestry there is as yet no liaison between the Board and the Commission with regard to assessing the effects of afforestation on run-off and river flows within the catchments of hydro-electric schemes. It is appreciated that state forestry in both the Beauly and Tummel areas is as yet in the early stages of development, while in Mid-Argyll, with the exception of the Glashan Scheme, hydro-electric schemes lie outwith areas acquired by the Commission for planting. Never-:theless, considering the long term effects of afforestation on the rate of run-off, it would seem desirable that where their developments overlap, the Board and the Commission should cooperate in carrying through joint fluviometric studies similar in nature to those already being done in Galloway between the South Board and the Commission. Glen Affric and the catchment of Loch Glashan would appear to offer suitable locations for study despite the fact that in both cases considerable areas are already planted. Comparisons could also be made with areas devoid of forest cover so contributing to our current scant knowledge of Scottish run-off and river flow studies. This is of prime importance if ever ways and means are to be found of combatting the scourge of flooding which at present limits the agricultural use which might otherwise be made of valuable bottom land in many glens throughout the Highlands.

Agriculture

Considering that a hydro-electric scheme normally involves the flooding of bottom land it was only natural that agriculturalists should view proposed schemes with a certain degree of trepidation. In all three areas considerable acreages have been inundated round each of the main reservoirs, however, owing to the limited value of much of this land - generally rough pasture on account of the elevation of many of the reservoirs - prior to flooding, its loss has been of little consequence to agriculture. In such cases the inundation of former tracks and buildings as at Mullardoch, Monar and Sloy, entailing loss of access to grazings and in some cases consequent reduction in sheep stocks, has been much more serious. At Mullardoch, for instance, where hill farming has been seriously curtailed, some alternative means ought to have been found of providing access to the valuable grazings at the head of Glen Cannich.

In the Tummel Basin the effects of inundation are somewhat different from elsewhere. The creation of Loch Faskally and the raising of Loch Tummel flooded several hundred acres of land of cropping and/or wintering value, by reason of the low elevation (less than 400 ft. OD.) of these lochs, so seriously interfering with the economy of local farming. Some farms lost the greater part, or, in one case, the whole of their arable land, losses which have only been partially made good, where opportunity presented, by the breaking in of former hill.

On the credit side the damming of tributary rivers has resulted in a reduction in the frequency and incidence of flooding downstream from the dam sites of consequent benefit to farming. Largely on account of the physiography of the Beauly Basin and by reason of the location of the dams, Strathglass has been the greatest beneficiary, bottom land being now more intensively utilised both for cropping and wintering. In the basin the consequent benefits accruing to farming from flood control are considered to have more than offset any losses entailed round the reservoirs. Similar benefits have followed damming in Mid-Argyll and great store is being laid on the control which will be exercised on the River Add once the Board's Glashan Scheme is completed.

In hill farming circles considerable resentment is still felt against the Forestry Commission although it must be stated that relations do vary considerably between one district and another and between earlier and more recent acquisitions. Since all the earlier, that is, pre-war acquisitions, with the exception of a small area of Guisachan Forest in Strathglass, are in Mid-Argyll, relations are in general more strained in the latter region that in Beauly or Tummel. This resentment is the product of both fear and prejudice against a state run authority whose views on land values may clash with their own and which has not only hindered the normalisation of relations between the two sides but created difficulties in the pursuance of this study. Much of the trouble appears to stem from the following facts.

(1) In their pursuit to produce as much marketable timber as early and as profitably as possible, there are instances, particularly in the earlier acquisitions, where the Commission were guilty of planting sheltered rough grazings of wintering value to the extent of upsetting the balance of agricultural units.

(2) Some farms designed to be retained as agricultural units are no longer economic, at least in their former capacity, largely through inadequate precaution having been taken to retain sufficient acreage for farming purpose.

(3) Inadequate provision was made in certain instances, for rides of suitable width through plantations on lower slopes so that access to upland grazings might be safe-:guarded.

Fears and prejudices indeed die hard and although there is no doubt that the mistakes committed in the past in the acquisition of land for planting were legitimate grievances on the part of many hill farmers, there is evidence that such grievances have often been greatly magnified in a vain attempt to hinder or prevent the sub-:sequent acquisition of land for afforestation, even although since the Forestry Act (1945), the conditions under which land may be acquired for planting has been sub-:stantially altered. Today, a much closer cooperation exists between the Forestry Commission and the Department of Agriculture to the subsequent benefit of hill farming. This has somewhat helped to improve relations between forest and farming interests and would seem largely responsible for the general harmony which exists

between the two sides in Beauly and Tummel, neither of which, of course, experienced the earlier difficulties in Mid-Argyll. The fact that the Commission is now more willing to acquire smaller blocks for planting and the trend towards the establishment of shelter blocks of benefit to farm stock, has helped promote understanding among hill farmers of the benefits which may accrue from forestry in hill farming areas. Whether, of course, this has proved financially lucrative to the Commission is indeed another matter.

On private estates there is evidence that much has and is being done to integrate farming and forestry on hill land and with considerable success. Considering the close liaison which now exists between the Commission and private woodland owners, it would seem that the successful integration of farming and forestry on many private estates may have in part been responsible for the adoption of a more flexible planting policy in recent years on land acquired by the Commission.

While there may have been local losses, on a regional basis the numbers of cattle and sheep are greater today in each of the three areas than formerly. This is largely as a result of improvement in the economics of hill farming motivated by post-war subsidy, grants and loans, but since increases are greater in both Tummel and Beauly than in Mid-Argyll, it would seem that the closer working arrangement between the two industries over the post-war period has also been of benefit.

When assessing the effects and value of forestry, one must bear in mind that when initially acquired much hill land was seriously understocked, consequently, its direction to forestry, despite any losses which may have followed to agriculture, was a positive step to bring such land back into production to the benefit of both the local and national economy.

An interesting corollary from forestry has been the establishment of forest holdings. At present nearly 90 holdings are scattered throughout Mid-Argyll although as yet, by reason of the stage of forest development in Beauly and Tummel, holdings there are very much fewer in number. Holdings have proved of advantage in providing the Commission with a valuable source of labour, in maintaining a link between agriculture and forestry and in retaining a valuable element in the local population which, in

the absence of forest employment, would have drifted from the area. Their creation has thus adequately fulfilled the Acland Committee's diction that, "Families settled on new holdings in forest areas will be a net addition to the resident rural popu-:lation".

Deer

Deer forests of considerable importance still exist in the Beauly and Tummel basins. Generally, hydro developments are considered of little consequence to deer. More pertinent are the restrictions provided by forest fences, particularly in winter, to the movement of deer to traditional wintering grounds. In Rannoch this has had the effect of channelling deer on to neighbouring agricultural land with consequent loss to sheep grazings, however, with proper control of the numbers of deer initiated by the Red Deer Commission and the protection of agricultural land by further fencing, the problem is not insurmountable. Once trees are established the incidence of damage from deer is greatly lessened such that the forest may be opened for the shelter of deer. This has been done with success on the Atholl Estates, although as far as is known, the Commission have not yet embarked upon this policy.

Electricity - Its Application in the Daily Lives of the People

It was pleasing to note that electricity is generally now widely available although in the Tummel Valley, it was disconcerting to note that a considerable number of habi-:tations still remained, for a variety of reasons, to be connected to a mains supply. Where a grid supply is available there is little doubt of the advantages being taken of electricity through the widespread use of domestic appliances. Electricity has already proved its worth in promoting tourism while the availability of a mains supply has proved a paramount importance to rural tradesmen. On the other hand, while electricity was favourable commented upon as a great saver of time, labour, cleanli-:ness and in ease of operation on the farm, much more use remains to be made of electricity, particularly for the drying of grain and hay, both features which would prove of inestimable benefit to Highland agriculture, if widely applied, in view of weather conditions. Reluctance to instal electrical machinery is primarily economic, although many farmers do not yet seem to be mentally adjusted to the possibilities

presented to local farming by the availability of electric power. With regard to economic difficulties, it is suggested that these could be largely overcome if hay drying, for example, were done on a collective basis. It is appreciated, of course, that the opportunities presented in the application of electricity to Highland farming are less than in the Lowlands.

Population and Society

Population has been maintained and in places increased through hydro-electric development and the establishment and expansion of state forestry. A striking feature of both hydro and forest populations is the high proportion of young adults and children - this last is also revealed in study of school rolls - which has been of advantage in creating a healthier age-structure within the resident population. This would appear to raise hopes for the future maintenance of population in these areas where such developments have taken place.

By reason of low population density, both the Commission and the Board were obliged to recruit a large proportion of their labour force from outside. This is particularly true of forest populations in Mid-Argyll where many people are of Lowland origin, mainly from the Glasgow area.

Remoteness, poor secondary educational facilities largely arising from distance to be travelled to and from school, and high charges for most commodities consequent on freight charges, present snags to incomer families, the degree of difficulty which may arise, varying according to the type, temperament and origin of the individual. Generally, hydro families in their comfortable homes are quite content but forest families, particularly in Mid-Argyll, are less settled. Apart from the reasons listed above, the low basic wage paid to forest workers tends to lead to the recruitment of a poor type of labour of urban origin which experiences greater difficulty than one would normally expect in adjusting from town life to life in a rural environment. The result is a continuous turnover among forest employees and families which, apart from any detrimental effect this may have on local community life, is hardly conducive to successful forestry. In view of this it is desired that the Commission take immediate steps to increase the basic wage of forest workers which, it is believed,

would not only stimulate recruitment, but would draw a better class of worker into forest employment to the consequent benefit of both the Commission and local society. Higher wages may also act as an incentive to children of forest employees to take up forestry as a career.

A notable experiment in Mid-Argyll was the establishment of forest villages primarily intended to provide a pool of labour for future forest requirements. Despite the provision of comfortable housing, halls, schools and various recreational facilities by the Commission and Argyll County Council, these villages, largely by reason of their remoteness, the type of labour resident and the fact that they are essentiallycommunities dependent on a single economy, namely, forestry, have proved less successful both economically and socially than originally intended. Nevertheless, despite such shortcomings they have been the means of bringing people back into areas which for decades had lost population. Perhaps with the further expansion of forestry and the establishment of forest industries they may yet become viable communities.

The grafting of hydro and forest populations on to existing communities has generally been blessed with greater success. Cannich, Pitlochry and Arrochar/Tarbet are notable examples. In all three, incomer families have been accepted into the local community, so enriching the social life of the respective localities. It is appreciated that while forest requirements may not always allow forest families to be housed in villages or localities where there is the resemblance of an active com-:munity life and spirit, it was most gratifying to note that where this was practicable and had been carried through - Cannich is perhaps the supreme example of a genuinely successful attempt by the joint efforts of the Board and Commission to resuscitate life in a community - the effort had been relatively successful to the consequent benefit of forest locally.

Economic Effects

Great hope was expressed that the availability of electric power would attract new industries to the areas under study, however, with one or two minor exceptions, no new industries have been established as a direct consequence of electricity although existing industry has benefitted from the provision of power supplies. The

difficulties of attracting industry to a Highland locality are amply provided by the Cannich Development Plan which was designed as a blueprint for Highland develop-:ment. Since its preparation in 1952, the plan has lain in abeyance for, despite considerable effort by the Board and local authorities, no new industries have as yet materialised. Remoteness from centres of industry, difficulties arising from transport and communications, paucity of raw materials and distance from market, are but a few of the factors militating against industrial development by private enter-:prise.

With a growing number of young people - mainly from incomer families - rapidly approaching school leaving age, there is a pressing need to establish alternative means of employment to those which already exist. Suggested industries include wood using industries of various kinds - the establishment of the Cowal Ari Mill at Strachur offers hope for expansion along this or similar lines in all three regions in the future - further expansion in tourism, the establishment of craft centres and light engineering at selected centres. Industry on a larger scale ought to be encouraged in the burghs. Further expansion in forestry will lead to increased employment in the industry but owing to the nature of the work this is unlikely to offer much incentive to young people, consequently, unless other industry is somehow attracted, young people will be forced to leave in increasing numbers, thus pre-:cipitating the very conditions which all interested individuals and bodies, including the Board and the Commission, have been trying to avoid.

In the course of this survey it has become abundantly clear that while the developments carried through by the North of Scotland Hydro-Electric Board and the Forestry Commission have done much to improve the social and economic well-being of the Highlands, considerable problems still remain - not least the continuing drift of population despite the influx of labour consequent on hydro and forest requirements. It is believed that this is primarily because new industries have not developed to meet changing requirements and to balance those industries which

are already in existence.[a] A self supporting economy based on hill farming and forestry with tourism as a secondary industry may be ideal in theory, but while these industries ought to be encouraged by every available means, an economy based on them alone is an anachronism in a Britain whose values and pattern of life are becoming increasingly dominated and set by the big towns and need for industrial development, the latter providing a broad basis for employment within the economy.

There are four ways open to the future of the Highlands.

(1) The Highlands' social and economic needs can be ignored as was done in much of the late 18th and 19th centuries and which precipitated many of the ecological, economic and social problems with which we are faced at present. Under such a scheme the human population would eventually wither away.

(2) An attempt may be made to artificially bolster and protect against change these things popularly regarded as characteristic of and best in Highland life and economy, although in many cases, these are unknowingly the very factors contributing to present problems. The adoption of such a course is common among minority groups throughout the world where, by attempting to create resistance to pressure by reaction, it is hoped to preserve their distinctive character. But such a course of action ultimately implies death from within, for unless there is a genuine effort to adapt society and economy to present realities, they can no longer evolve and so become encysted.

(3) Present policy has done much to bolster the Highland economy through substantial and increasing assistance to local industry, agriculture and forestry. Notable efforts have been made and spectacular results obtained by the North of Scotland Hydro-Electric Board, the Forestry Commission, the Highland Fund, the Crofters' Commission

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[a]This is no reflection on the Hydro Board who are to be complimented on their initiative in doing their utmost to attract industry to the North of Scotland District. Since the Board's inception, nearly 250 new industries (Dec. 1962) have been established in the Board's area of supply. While this is a laudable achievement, the facts remain that only a small fraction of these could be classed as having become established as a direct result of the availability of electricity, while the majority are located in the larger centres of population located on the periphery of the region, notably, Aberdeen, Dundee, Inverness and Perth.

and the various Government subsidies, grants and loans now available for economic improvement, despite much initial criticism that the success of such schemes was an idealistic impossibility. But laudable though such efforts are, the problem is of such magnitude that in many cases the results obtained have only acted as a tourniquet, that is, they have merely arrested the draining away of the life blood which has con-:tinued for so long. One may, therefore, conclude that efforts as at present adminis-:tered are insufficient to eradicate the root causes of the Highland problem.

(4) This brings us to a consideration of the fourth and only practicable way in the writer's view of tackling the Highland problem, namely, through a comprehensive scheme for Highland rehabilitation and development.

The Need for a Comprehensive Development Plan

In some circles any reference to a planned economy is still viewed with a deep-seated suspicion, but what does planning entail? Planning may be broadly defined as the intelligent use by a free community of its environment for the common good of its neighbours, its successors and for itself. In the Highlands the means to economic expansion may exist, but lacking the ability to develop them - primarily through lack of coordination between bodies concerned with Highland development and lack of finance - the economy continues to stagnate. It is argued that three hundred and fifty years of rule from London have eroded our national spirit, confused and misled our understanding, captured or driven into exile our boldest and brainiest, deprived us of the habit of effective political cooperation, and weakened our sense that we are a nation. Undoubtedly, there is a great deal of truth in this dictum but to admit that we have reached the point of no return is to admit to a sense of reaction similar to that listed in (2) above, and to express a lack of faith in the future of the country and of the Highlands to adapt themselves successfully to changed circumstances. It is the writer's earnest conviction that there exists within the Highlands the necessary energy for future development, a sort of latent dynamic which awaits harnessing through the inauguration of a democratic plan of action. A maxim worth remembering and repeated on a previous page[a] is that while true

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progress can really derive only from self help, the latter can only flourish within a democratic plan of action. Remove the causes of the frustration which at present stultifies development in many communities and the whole economy will leap forward.

It is here that the preparation and setting up of a comprehensive plan for Highland rehabilitation and development can best play a part. It is, therefore, proposed that a Development Authority be set up for the whole of the Highlands and Islands, including Orkney and Shetland but excluding the City of Aberdeen and Buchan, to coordinate development throughout the whole region. The Development Authority would consist of a Central Development Board and subsidiary Area Boards concerned with the problems of specific areas. The Area Boards would, however, be responsible to the Central Board, who in turn would be required to see that developments in the various sub-regions were coordinated within the overall plan for the Highlands. The Central Board might consist of a chairman - someone knowledgeable of Highland affairs and problems, representatives from the county councils of the seven Crofting Counties plus Bute, Moray, Nairn and Perthshire, while Angus, Banff and Aberdeenshire might also be requested to send representatives on account of the considerable areas of each within the Highlands, and a small panel of experts with special knowledge of administration, agriculture including crofting, forestry, ecology, power, industry, tourism and transport. Chairmen of Area Boards would also be represented on the Central Board.

At least eight Area Boards are envisaged. Suggested areas are:-

(1) Shetland
(2) Orkney
(3) Outer Hebrides
(4) Skye, Mull, West Sutherland, Wester Ross, West Inverness and that part of Argyll west of the Great Glen.
(5) Caithness, East Sutherland, Easter Ross and the Moray Firth Coastlands of Inverness, Moray and Nairn.
(6) Badenoch, Deeside, Strathdon and adjacent parts of Banff.
(7) Highland Perthshire and Angus.
(8) The rest of Argyll, Bute and Southern Isles.

These are arbitrary divisions based on similarity of topography, climate, social and economic geography and related problems, and which may be further sub-divided as considered necessary. It will be noted that on the above basis, the Beauly

Basin, Tummel Basin and Mid-Argyll would fall within Areas (5), (7) and (8) respectively. Area Boards would be constituted similarly to those of the Central Board except that representatives from district councils, rather than from county councils, would be elected to serve. Again, a panel of experts concerned with problems as they pertain to the respective areas would serve on Area Boards.

To help coordinate the work of the Central and Area Boards, advisory Committees composed of experts in the fields of administration, agriculture including crofting, forestry, ecology, power, industry, tourism and transport, from the Central Board and each of the Area Boards, would fulfil the role of functional committees to give advice within their respective fields. These would fulfil roles similar to those played by the Amenities and Fisheries Committees with respect to the North of Scotland Hydro-Electric Board.

The work at present being carried through by many existing bodies concerned with Highland development, for example, the Highlands and Islands Advisory Panel, would be taken over. This would have the advantageous effect of considerably reducing the existing multiplicity of bodies dealing with Highland affairs. It is not, however, envisaged that such large undertakings as the North of Scotland Hydro-Electric Board or the Forestry Commission would disappear. Rather would their powers be amended to dovetail with the powers of the Development Authority. Close liaison would exist between the Authority, the Board[a] and the Commission as provided for in the functional Committees, which, it is suggested, should include representatives from both. Other bodies dealing with specific interests such as the Tourist Board, the Crofters' Commission, the Crofters' Union and the Scottish Woodland Owners' Association, some of which are bodies of national importance, would continue as independent bodies, although working in the closest liaison with the Development Authority.

What would be the main functions and powers of such an authority? The first task would be the collation of information and statistical data on all aspects of economy and society so as to provide first hand knowledge and appreciation of the

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[a] Ways and means would require to be found through perhaps the help of additional grants or loans for speeding up the connection of those premises - most of which are in remote areas - still awaiting a supply of electricity.

various needs and requirements of the region as a whole. Such a survey would pinpoint the various shortcomings in the economy and in present policy, so establishing the real causes of present problems. Much information already exists in the form of county reports, geographical theses and regional dissertations which, although perhaps out of date, would serve the useful purpose of providing information as to trends within the economy and in population number, distribution and density. Having dis-:cerned regional and areal difficulties and requirements, the Authority would then be required to prepare plans for the various schemes of social and economic rehabilita-:tion and development which are considered necessary for the future well-being of the region. These in turn would be submitted to the Secretary of State for approval. It is envisaged that existing planning authorities within county councils would be required to delegate a considerable part of their present powers to the Development Authority.

The question of finance would be of paramount importance for an inadequately financed authority might be worse than no authority at all. A Development Authority endowed with its own capital development fund for the financing of likely industrial developments, backed by powerful tax incentives to encourage industrialists to invest in the Highlands would be a necessary requisite. After such a long period of neglect, considerable sums of money would have to be spent initially on schemes of improve-:ment in order to provide a sure foundation for future development. No great diffi-:culty, however, need be encountered in raising the necessary finance if the Govern-:ment were to budget a greater proportion of the national income for use by develop-:ment authorities. This would in time prove a healthy investment as a considerable proportion of the outlay would be recovered through reduced need for national assistance and employment benefit and through the greater spending power which would accompany the creation of a more buoyant economy.

Much more could be done than hitherto to publicise what the Highlands have to offer industrialists from the south. There is a common belief that factories, whether large or small, in rural areas, are uneconomic because of transport costs, but this is because only the direct costs of such industries are generally considered when making an appreciation of the potentiality of establishing a factory in a rural

community. Were more consideration given to the saving in overheads such as the cost of the acquisition of sites and the availability of labour, the differences between expansion in the Lowlands or in England and that in a Highland area might be largely offset. Care, however, ought to be exercised not to place undue emphasis on the need to attract industry from outside. Rural craftsmen and tradesmen can play a vital part in revivifying the economy and must be encouraged by all available means to expand their businesses. This could be further encouraged by the setting up at selected points of facilities for the training of young men and women in selected trades and crafts. In general, a multiplicity of small industries widely scattered throughout the region ought to be encouraged rather than large concerns at a few selected sites, by reason of the greater advantage which would follow in providing employment to scattered communities and, consequently, in retaining population.

A Development Authority would have powers to plan land use more efficiently than at present. This would serve to indicate, for example, those areas where the Forestry Commission should concentrate in the economic production of timber from extensive forests and those where they would be induced to operate as an instrument of social policy. In certain districts this would perhaps create hardship for the agricultural community or would prove financially less remunerative to the Commission, but in the long run would be to the mutual advantage of both industries, and to the economy at large. Planned land use would also serve to resolve the conflicting claims of hydro-electric development with those of amenity and fisheries.

Considering that the resuscitation of the Highland economy is a long term project, it is suggested that planning might best be carried out by setting targets over given periods for social and economic recovery. Working towards a target over a given period tends to have a strong psychological effect on people, bodies and institutions. In a free society like ours it may be argued that it is pointless to have an exercise whose rules cannot be enforced. However, planning with set targets has been of such notable success in countries such as Italy and France, that the principle has already been accepted by the British Government when the National Economic Development Council, popularly known as "Neddy," was set up. The

Council now has an annual growth target of four per cent and it is understood that the present Government is coming round to the need for regional programmes within a national plan.

Plans and set targets for economic growth over given periods might include specific suggestions for industries which are both environmentally suitable and capable of generating further growth in certain areas. A project of the size of the proposed Lochaber pulp and paper mill may prove a nucleus for enterprises of a kindred type with hopes that other enterprises using timber may be drawn into the neighbourhood. The planning of such projects would provide the basis for the establishment of growth points as advocated in the Toothill Report.

It is envisaged that the setting up of a Highland Development Authority would pave the way for the establishment of like authorities in other parts of Scotland. Bodies such as the Scottish Council and Board of Trade could then play a vital part in coordinating developments on a national basis, so avoiding unnecessary competition and duplication between authorities. Under such a scheme, the Board of Trade would delegate to the regional development authorities much of its present responsibility for attracting and steering new industries and the expansion of existing ones to various areas. This would be of advantage in speeding up the time required for negotiating terms for industrial expansion compared to that currently in operation under the present Board of Trade Advisory Committee which caters for the whole of the United Kingdom. In practice, the adoption of the principles embodied in this chapter would result in greater devolution in economic power and responsibility and through reviving and recreating local pride and responsibility, would give a new meaning to local government which in many areas has long suffered from apathy and neglect.

The suggestions made here for the setting up of a Highland Development Authority are not intended to be a blueprint for Highland development but rather to draw the readers' attention to the need for the creation of some sort of body in the Highlands with the means to execute policy as well as to plan it. The task of revivifying the Highland economy is a formidably challenging one concerning the need for

socio-economic planning based on the most exhaustive and imaginative studies of the needs and potentials of the whole region. The reason why our best minds have not accepted the challenge is because opportunity for achievement under present policy and administration is too limited. However, the setting up of a Development Authority, within a comprehensive plan for rehabilitation and development, may well provide the necessary impetus to the rebirth of enterprise and initiative throughout the region by constituting a rallying point for much frustrated talent at present wasted or under-utilised. No one owes the Highlands a living but the region must have the right tools for development. Therein lies the secret of success.

The writer wishes to state in conclusion that the reading of this summary, with perhaps the exception of the latter section on Highland development, can be no sub-:stitute for reading the main body of the thesis which, in itself, is largely a digest of a vast quantity of information and data.

APPENDICES

APPENDIX - 1.

THE END OF THE ROAD?

As an integral part of hydro-electric development, the North of Scotland Hydro-Electric Board have constructed, diverted or reconstructed nearly 400 miles[a] of roads, nearly one third of which are new roads, throughout the Highlands. A considerable proportion of this mileage is taken up by access roads built to the sites of dams, power stations and associated works. In consequence, these roads constitute a bold, imaginative and, may it be added, a successful attempt to open up considerable areas of the country which, by reason of difficulty of access and remoteness, were seldom visited before. One must further bear in mind that these roads have been constructed at a time when tourism is in the ascendancy and when, with growing affluence, more and more people are acquiring opportunity to travel, consequently, it was with con-:siderable annoyance and, may it be added, anger, that the writer learned of gates having been erected across some of these roads to exclude visitors.

To debar people in this fashion can only be described as an iniquitous act, which, whether intended or not, aims at perpetuating the ills which have bedevilled the social and economic geography of the Highlands for so long. Can modern Scotland afford to allow this monomaniac and feudalistic outlook of late 18th and 19th century landlordism to continue? Let it at once be said that the writer has no great anta-:gonism towards private estates and owners as such and to the need for conserving privacy within reasonable limits, but can one any longer justify attempts to set aside for exclusive use thousands of acres of some of the finest scenic areas in the country to which access has been greatly improved by the provision of roads built at public expense? To condone such action is to condone an attitude of mind which displays a trait of selfishness, not merely decidedly un-Christian, but directly in opposition to all present and future plans for Highland development.

The road in the accompanying photograph provides a vital and necessary link between the upper reaches of Glens Lyon and Lochay and between the former and the

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[a] 1960 figures.

village of Killin, which serves as the social, educational and trading centre of this part of Breadalbane. Of as great value is the circular route which it provides to tourist and other traffic which formerly, after reaching the head of either glen, was forced to about turn. Its closure has aroused much bitter antagonism among both locals and tourists.[a]

Prior to the construction of the present road, a path connected the two glens by way of the pass. According to local opinion this path was at one time used by pack horses for the transport of provisions and materials and there would seem evidence to suggest that an old drove road followed this route. It seems, therefore, that this was originally a right of way which, with changed circumstances partly con-:sequent on population decline, had fallen into disuse. The writer has as yet been unable to establish by law whether, in cases such as this, motorised vehicular traffic which has since replaced the former method of public transport by pack horse, is per-:mitted to use such routes. If so, then the outcome would be revolutionary for the Highlands for it would provide access over scores of routes from which the privately-owned motor car is at present prohibited.

To date, fortunately none of the roads built or reconstructed by the Board in the three regions under study are closed to vehicular traffic, with the exception of the new road which provides access to the Loch Ericht Power Station and which branches north from the B.846 near Rannoch Power Station. Whether this road will remain closed once work is completed on the site of the power station is at present unknown. More pertinent perhaps is the future of public access to Monar (Glen Strathfarrar) - 15 miles, and to the Shira dams (Glen Shira) - 9 miles. The landscaping undertaken round the reservoirs at the latter would suggest that the Hydro Board have hopes of the road remaining open, although at time of last visitation (1961), it was rumoured that the owner in question was considering placing a gate across the road at the foot of the glen to debar visitors.[b]

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[a]Pedestrians are allowed to use the roadway.

[b]It is paradoxical that while the Board are required to have due regard to amenity in the construction of their schemes, landowners, apparently have powers to debar the public from viewing the finished works.

One can only express hope that sane judgement may prevail in reaching a decision in this and other similar situations. In cases like Glen Lyon every pressure must be brought to bear on the powers in question to have the roads reopened. A precedent has been established which the longer it is allowed to continue will become the more difficult to revoke. The solution lies in the hands of all interested bodies and individuals, indeed, in the hands of all interested in the welfare of the Highlands. Immediate action on a united front is called for.

201.

201. The End of the Road? Lubreoch, Glen Lyon, Perthshire. Owing to the Landowner's intransigence, the road is at present closed to vehicular traffic.

APPENDIX - 2

FACTS AND FIGURES

A. NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Statistics are compiled from the Board's Annual Reports and from figures supplied by the Board.

Installed Capacity (kW)

	1949	1952	1955	1958	1960	1961
Water	86,915	391,225	558,795	813,066	875,012	884,512
Steam	131,395	130,625	102,875	132,875	132,875	132,875
Diesel	32,660	37,752	42,372	49,521	44,697	44,697
	250,970	559,602	704,042	995,462	1,052,584	1,062,084

Millions of Units Generated

	1949	1952	1955 *	1958	1960	1961
Water	322	889	840	1,683	2,089	2,726
Steam	320	296	528	294	255	114
Diesel	68	52	64	66	69	69
	710	1,237	1,432	2,043	2,413	2,909

* Dry Year

Consumers Connected to a Grid Supply

	1948	1960	1961
Connected by Previous Undertakings taken over by Board on 1st April, 1948	188,424	188,424	188,424
Connected by Board at end of Year	-	204,508	211,756
	188,424	392,932	400,180 *

* This represents approximately 92% of potential consumers.

Farms and Crofts Connected to a Grid Supply

	Farms	Crofts	Total
Connected at 1st April, 1948	1,440	550	1,950
Connected at 31st December, 1952	4,844	6,459	11,303
Connected at 31st December, 1956	10,746	12,082	22,828
Connected at 31st December, 1960	15,265	16,051	31,116
Connected at 31st December, 1961	15,802	16,156	31,958
Still awaiting Connection	3,498	5,644	9,142
Total Farms and Crofts in Area	19,300	21,800	41,100
Percentage of total connected at 31st December 1961	81.9	74.1	77.8

Sales of Electricity to Different Classes of Consumers
(Millions of Units)

	1949	1952	1955	1958	1960	1961
Domestic	206	293	421	570	699	804
Farm	15	38	70	114	131	143
Commercial	102	144	204	275	327	368
Industrial	163	230	287	340	407	421
Public Lighting	6	8	11	14	17	19
Traction	19	14	11	1	-	-
Units used in Construction of Hydro-Electric schemes	27	20	57	35	21	27
Total Sales in Board's Area	538	747	1,061	1,349	1,602	1,782
Increase over 1949 (%)	-	38.8	97.4	150.7	197.8	231.2
Units sold to the South of Scotland Electricity Board	56	304	184	463	565	780
Total Units Sold	594	1,051	1,245	1,812	2,167	2,562
Units lost in Generating Stations and lost in Transmission and Distri-:bution	116	186	248	309	348	381
Total Units Available	710	1,237	1,493	2,121	2,515	2,943

Demand for Electricity in Scotland has quadrupled since 1942

Employment

	1948	1951	1954	1957	1960	1961
Number of Men on Construc-:tion Work	- [a]	4,450	7,362 [b]	5,713	2,161	2,270
Number of Permanent Staff	2,535	2,682	2,591 [b]	2,753	3,169	3,226

[a] Probably between 7 - 8,000.

[b] Disparity accounted for by the fact that 31 men employed as inspectors at hydro schemes were transferred to the staffs of various consulting engineers retained by the Board.

Housing

The number of houses erected for permanent staff by the end of 1961, was 378. Another 53 houses are expected to be built in consequence of the Strath-:farrar-Kilmorack and Awe schemes.

B. FORESTRY COMMISSION

Statistics are compiled from the Commission's Annual Reports and from figures supplied by the Commission.

Expansion of State Forestry in Scotland (acres)

	1948	1951	1954	1957	1960	1961
Land Area acquired	777,206	973,788	1,117,107	1,230,152	1,395,466	1,453,758
Under Plantations	210,767	289,236	390,917	481,864	561,312	594,356
To be planted	186,405	178,822	164,998	160,928	178,827	180,721
Areas scheduled for Forestry	397,172	489,058	555,915	642,792	740,139	774,077
Agricultural and other Land Use	560,453	505,730	561,192	587,360	665,325	679,681

Number of Forest Units

	1938	1948	1960
North Conservancy	-	47	72
East Conservancy	-	46	54
West Conservancy	-	27	47
South Conservancy	-	31	45
Total Scotland	107	151	218

Price of Plantable Land (Scotland)

The average price of plantable land per acre in 1960 was £4:8:0d. This com-:pares with £3:14:0d an acre in 1959. Average rent of plantable land was 4/4d per acre in 1960.

Number of Properties Managed by the Commission (Scotland) in 1959

Forest Properties	2,323
Foresters' Houses	337
Forest Workers' Houses	1,349
Forest Workers' Holding	484
Miscellaneous	153
Other Properties	1,804
Farms and other Agricultural Subjects	833
Residential and Miscellaneous	227
Sporting Lettings	744
Easements, Permissions, etc.	1,504
Total	5,631

Number of Workers and Staff (Scotland) in 1960

Full time	3957
Part-time	58
Total	4015

Mileage of Roads (Scotland) in 1960

Completed during Year	199
Under Construction at end of Year	625
Maintained	2,142

C. PRIVATE FORESTRY

Progress of Dedication and Approved Woodlands (Scotland)

	Number of		Acreage	
	Dedicated	Approved	Dedicated	Approved
At 30th September, 1954	238	19	175,871	7,039
At 30th September, 1960	446	78	273,606	42,126

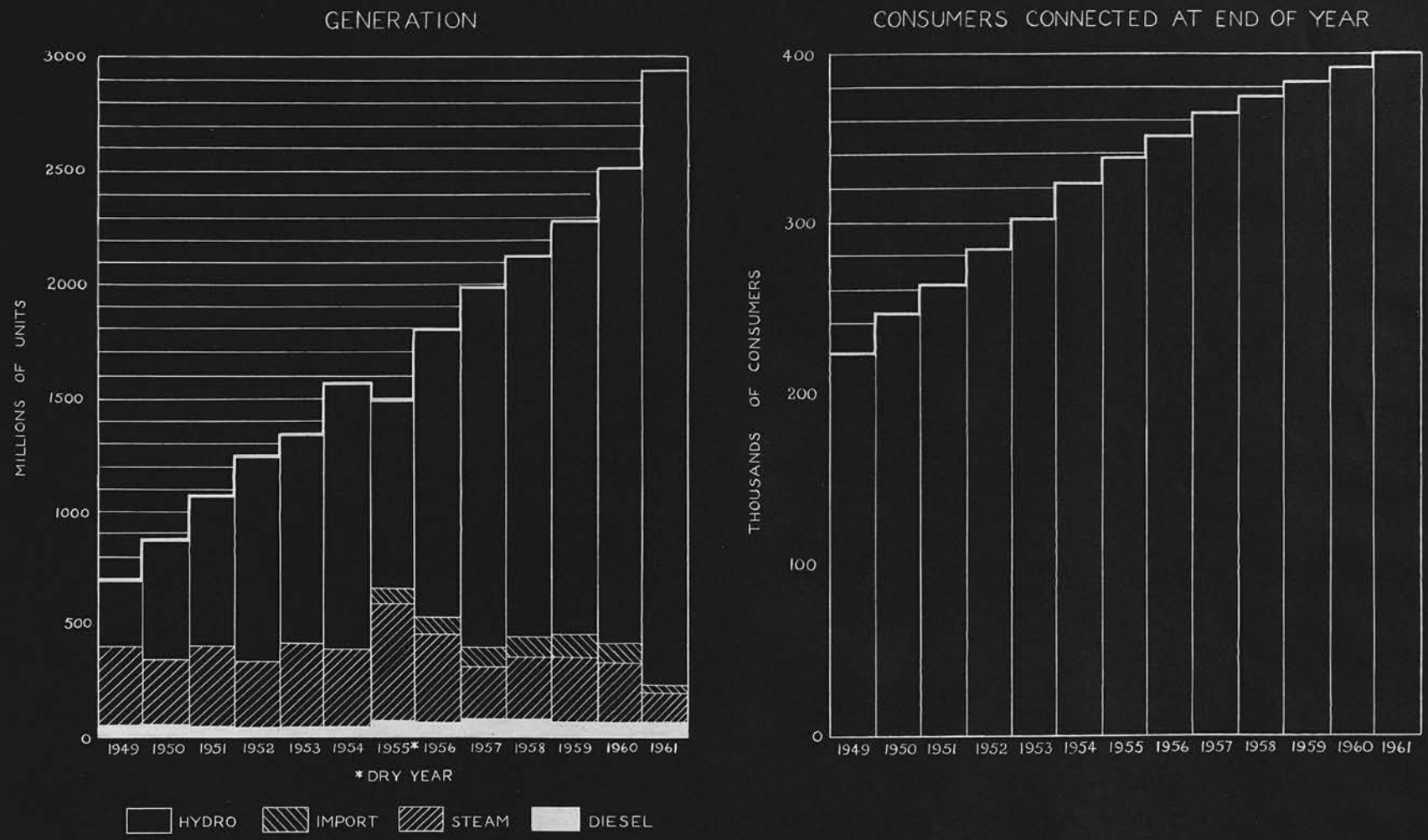

FIG.95. NORTH OF SCOTLAND DISTRICT - POWER GENERATION AND NUMBER OF CONSUMERS CONNECTED AT END OF YEAR, 1949-1961

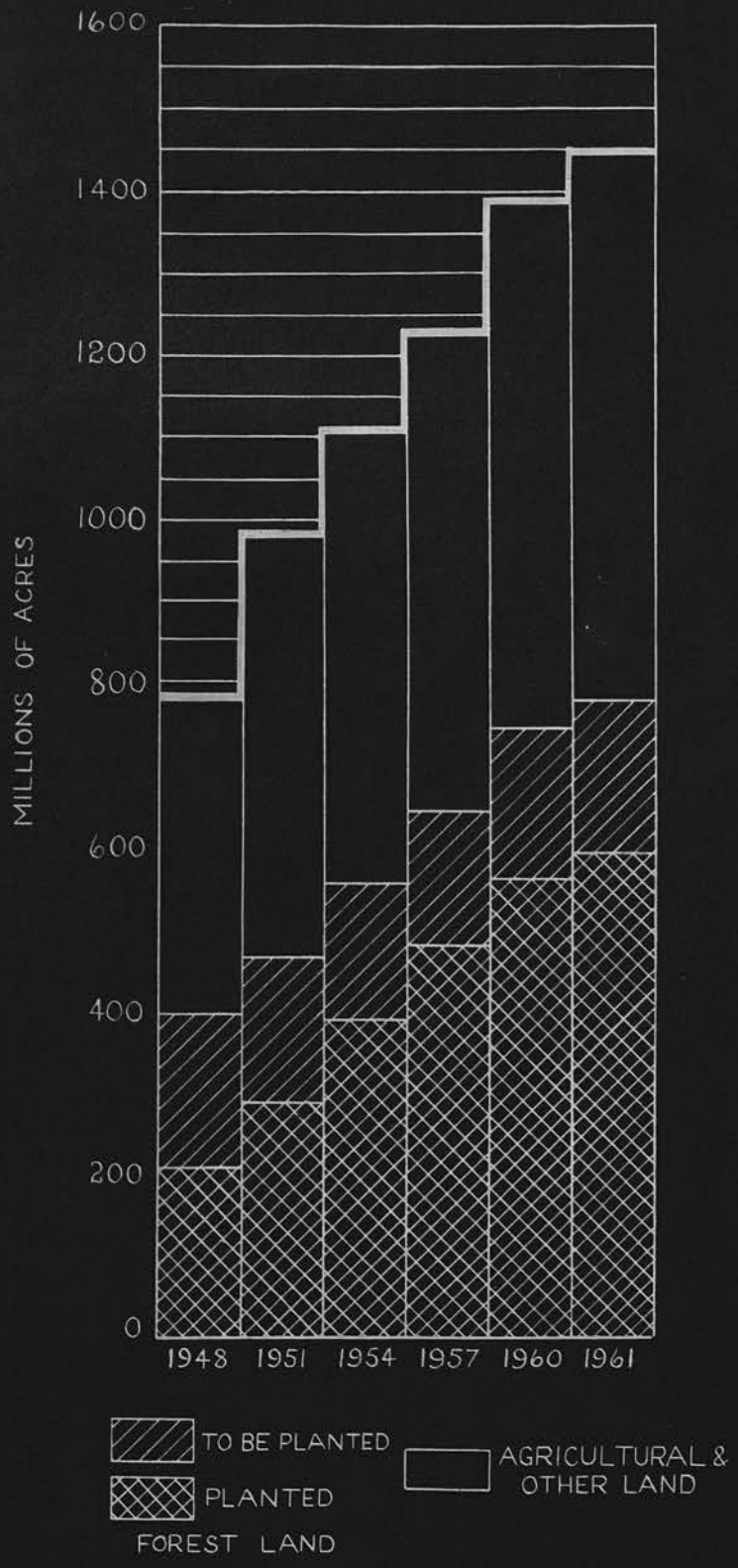

FIG.96. SCOTLAND - EXPANSION OF STATE FORESTRY, 1948-1961

SELECTED BIBLIOGRAPHY

GENERAL

1. ANDERSON, M.L. 1950. The Selection of Tree Species. Oliver & Boyd, Edinburgh.

2. ANDERSON, M.L. & EDWARDS, M.V. 1955. What are the Limits of Possible Afforesta-:tion in Scotland? S.G.M. Vol. 71.

3. ARGYLL, DUKE OF. 1887. Scotland as It was and as It is. Hamilton, London.

4. BAILY, F.G. 1931. Water Power Resources of Scotland. S.G.M. Vol. 47.

5. BAILY, F.G. 1945. Electricity in its Regional Setting, Essay No. 6 - Small Hydro-Electric Stations. Arch. Rev., Architectural Press, Cheam, Surrey.

6. BANKS, G.D. 1950. Hydro-Electric Development in the Highlands. S.G.M. Vol. 66.

7. BARCLAY, R.S. & DARLING, F.F. 1948. Recent Changes in Crofting Populations. Scot. Agric. (Winter Edition).

8. BARNETT, T.R. 1946. The Road to Rannoch and the Summer Isles. Grant, Edinburgh.

9. BARRON, E.M. 1925. State Afforestation in the Highlands. Trans. Inverness Scient.Soc. and Field Club, Vol. 9, Inverness.

10. BARRON, J. 1907. The Northern Highlands in the 19th Century. 3 Vols. Carruthers, Inverness.

11. BARROW, G. 1905. Geology of the Area around Pitlochry, Blair Atholl and Aberfeldy. Geol. Survey of Gt. Britain, Glasgow.

12. BATES, C.G. 1911. Wind breaks: their Influence and Value. U.S. Forest Service. Bull. Vol. 86.

13. BEATON, A.J. 1906. The Social and Economic Condition of the Highlands of Scotland since 1800, Mackay, Stirling.

14. BILHAM, E.G. 1938. The Climate of the British Isles. Macmillan, London.

15. BOEX, G. 1933. The Aluminium Industry in Scotland. Jour. Inst. Mech. Engrs., No. 125.

16. BOSWELL, J. 1785. The Journal of a Tour to the Hebrides with Samuel Johnston, LL.D. Dilly, London.

17. BOWIE, J.A. 1939. The Future of Scotland. Chambers, London.

18. BOYD, A. 1958. Ancient Rivers of the Scottish Highlands. "Country Life" (July).

19. BREMNER, A. 1942. The Origin of the Scottish River Systems. Pt. 3. S.G.M. Vol. 58.

20. CAMERON, A.G. 1923. The Wild Red Deer of Scotland. Blackwood, London.

21. CAMERON, J. 1912. The Old and New Highlands and Hebrides. Cameron, Kirkcaldy.

22. CAMPBELL, H.F. 1920. Highland Reconstruction. MacLaren, Glasgow.

23. CAMPBELL, J. 1907. Highland Shielings in the Olden Times. Trans. Inverness Scient. Soc. and Field Club, Vol. 5, Inverness.

24. CATTO, G.A. & BERESFORD-PEIRSE, H. 1953. Forestry and Farm Hill Land. "The Scotsman", 9/2/53.

25. CATTO, G.A. 1953. Crofts not the only Answer: Forestry's Place. The "Glasgow Herald", 20/3/53.

26. CHILTON, L.V. 1950. The Aluminium Industry in Scotland. S.G.M. Vol. 66.

27. CLARKE, W.E. 1917-18. Wild Life in a West Highland Deer Forest. 3 Arts. The "Scottish Naturalist".

28. CLAYTON, J. 1932. Afforestation in the Western Highlands and its Effects upon Repopulation. Geog. Vol. 17.

29. CLEGG, H.A. & CHESTER, T.E. 1953. The North of Scotland Hydro-Electric Board. Reprint from the Autumn Issue of "Public Administration".

30. CLERK, D. 1878. The Agriculture of the County of Argyll. Trans. Highland Soc., 4th Series, Vol. 10, Part 1.

31. COLLIER, A. 1953. The Crofting Problem. Social and Economic Studies No. 1. Dept. of Soc. and Econ. Research, Univ. of Glasgow, C.U.P.

32. DALLIMORE, W. 1910. Forestry in the Highlands of Scotland. Kew Bull.

33. DARLING, F.F. 1945. Crofting Agriculture - Its Practice in the West Highlands and Islands. Oliver & Boyd, Edinburgh.

34. DARLING, F.F. 1947. Natural History in the Highlands and Islands. Collins, London.

35. DARLING, F.F. 1949. History of the Scottish Forests. S.G.M. Vol. 65.

36. DARLING, F.F. (ed.) 1955. West Highland Survey. O.U.P.

37. DAWSON, W. 1911. The State and Private Woodlands. Trans. Royal Scot. Arbor. Soc. Vol. 24.

38. DAY, J.P. 1918. Public Administration in the Highlands and Islands of Scotland. U.L.P.

39. DEFOE, D. 1761. Tour through the Whole Island of Great Britain: Vol. 4, Scotland. Rivington, London.

40. DIXON, J.H. 1925. Pitlochry, Past and Present. MacKay, Pitlochry.

41. FAIRHURST, H. 1939. The Natural Vegetation of Scotland. S.G.M. Vol. 55.

42. FENTON, E.W. 1935. The Influence of Sheep on the Vegetation of Hill Grazings in Scotland. Jour. Ecol. Vol. 25.

43. FENTON, E.W. 1937. Some aspects of Man's influence on the Vegetation of Scotland. S.G.M. Vol. 53.

44. FENTON, E.W. 1938. Surviving Remnants of the Old Scottish Forests and their present day value. Scot. For. Jour. Vol. 52.

45. FENTON, E.W. 1939. Bracken, Heather and Mat Grass - An Ecological Triangle. S.G.M. Vol. 55.

46. FENTON, W.D.D. 1944. Hydro-Electric Resources of Scotland. Lecture 2, Pt. 3. Financing of Hydro-Electric Projects and Schemes for the Transmission and Distribution of Electricity. Scot. Local Sect. Inst. of Metals, Glasgow.

47. FENTON, W.D.D. 1951. The Scottish Hydro-Electric Scheme - its Industrial Potentialities. Reprinted from "The Secretary" (February).

48. FLEET, H. 1938. Erosion Surfaces in the Grampian Highlands of Scotland. Union Géographie Internationale, Paris.

49. FRASER, A. 1953. Survey of Blackface Sheep: Hardiness of the Breed questioned. "The Scotsman" 14/12/53.

50. FRASER, G.K. 1933. Studies of Scottish Moorlands in Relation to Tree Growth. F.C. Bull. No. 15. H.M.S.O., Edinburgh.

51. FRASER, G.K. 1943. Peat Deposits in Scotland. Geol. Survey. Wartime Pamphlet, No. 36.

52. FRASER, G.K. 1947. Forestry in the Scottish Highlands. Scot. Mount. Club. Jour.

53. FRAZER, A.H.H. 1939. Economic Aspects of the Scottish Sheep Industry. Trans. Highland and Agric. Soc. Vol. 51.

54. FULTON, A.A. 1944. Hydro-Electric Resources of Scotland, Lecture 2, Pt. 1. Assessment of Water Power Resources in the Highlands. Scot. Local Sect. Inst. of Metals, Glasgow.

55. GEDDES, A. 1945. Land Utilisation in the Highlands and Western Isles. S.G.M. Vol. 61.

56. GEDDES, A. & SPAVEN, F.D.N. 1949. "The Highlands and Isles. Studies in Regional Planning" (Ed. G.H.J. Deysh), Philip, London.

57. GEIKIE, A. 1887. The Scenery of Scotland (2nd Ed.). Macmillan, London.

58. GEIKIE, A. 1894. The Great Ice Age (3rd Ed.). Macmillan, London.

59. GIBB, J. 1938. The Problem of the Highlands. Geog. Mag. Vol. 7.

60. GILPIN, W. 1789. Observations in Several Parts of Great Britain - particularly the Highlands of Scotland - made in the year 1776 (3rd Ed.). 2 Vols. Blamire, London.

61. GLOYNE, R.W. 1955. Some Effects of Shelter Belts and Wind Breaks. Met. Mag. No. 84. London.

62. GORRIE, R.M. 1958. Water Resources and Water Needs in Scotland. Reprinted from "Nature". Vol. 182.

63. GRAEME, A. 1930. The Waters of Badenoch. Some Notes on the Grampian Elec-:tricity Scheme. Scots. Mag. Vol. 13., No. 4.

64. GRAHAM, H.G. 1934. The Social Life of Scotland in the 18th Century. Black, London.

65. GRANT, A.F. 1926. The Crofting System. Geog. Teacher Vol. 12.

66. GRANT, E. 1830. Memoirs of a Highland Lady - The Autobiography of Elizabeth Grant of Rothiemurchus. Butter & Tanner, London.

67. GRANT, I.F. 1930. The Social and Economic Development of Scotland before 1603. Oliver & Boyd, Edinburgh.

68. GRANT, I.F. 1950. The Economic History of Scotland. Economic History of Great Britain Series. Murray, London.

69. GRAY, M. 1957. The Highland Economy, 1750-1850. Oliver & Boyd, Edinburgh.

70. GRAY, S. 1958. Landscape and Power. Architectural Press, Cheam, Surrey.

71. GREGOR, M.J.F. & CRICHTON, R.M. 1946. Kinlochleven - from Croft to Factory, the Evolution of an Industrial Community in the Highlands. Nelson, London.

72. GUILLEBAULD, W.H. 1938. Afforestation of Difficult Peat and Upland Heath Soils. Forestry. Vol. 12(2).

73. GUTHRIE, W. 1944. Hydro-Electric Resources of Scotland. Lecture 2, Pt. 2. Transmission and Delivery of Hydro-Electricity. Scot. Local Sect. Inst. of Metals, Glasgow.

74. HAMILTON, H. 1932. The Industrial Revolution in Scotland. O.U.P.

75. HAMILTON-DOUGLAS, LORD MALCOLM. 1945. The Threat to Pitlochry. Arch.Rev., Architectural Press, Cheam, Surrey.

76. HANCE, W.A. 1949. The Outer Hebrides in relation to Highland Depopulation. Part thesis for the Degree of Ph.D., Columbia University. Lithoprinted from the author's typescript by Edward Brothers, Inc., An Arbor, Michigan, U.S.A.

77. HARDY, M. 1906. Botanical Survey of Scotland. S.G.M. Vol. 22.

78. HAYES, G.C. 1952. A Survey of West Highland Agriculture. Proc.Agric.Econ. Soc. Vol. 10, No. 1.

79. HEDDLE, H. 1880. Minerals at Struy. Trans. Inverness Scient. Soc. and Field Club, Vol. 1.

80. HENDRICK, J. 1925. Some Characteristics of Scottish Soils. Trans. Highlands and Agric. Soc. Scot. Vol. 37.

81. HERON, R. 1793. Observations on a Journey through the Western Counties of Scotland in the Autumn of 1792. Perth.

82. HINXMAN, L.W. 1907. The Rivers of Scotland: the Beauly and Conon. S.G.M. Vol. 23.

83. HUNTER, T. 1883. Woods, Forests and Estates of Perthshire, with sketches of the Principal Families of the County. Henderson & Robertson, Perth.

84. HUTCHINSON, B. 1935. Depopulation and Rural Life in Scotland. "Nature" No. 4354.

85. IRVINE, A. 1802. An Inquiry into the Causes and Effects of Emigration from the Highlands and Western Islands of Scotland with Observations on the Means to be employed in preventing it. Edinburgh.

86. JAATINEN, S. 1957. The Human Geography of the Outer Hebrides. Tilgmann, Helsinki.

87. JOHNSTON, Rt. HON. T. 1948. Hydro-Electric Development in Scotland. Paper read to the Greenock Phil. Soc.

88. JOHNSTON, Rt. HON. T. 1952. Hydro-Electric Power and the Future of the Highlands. Lecture, Mitchell Library, Glasgow. (October)

89. KEIR, D. 1938. The Desolation of the Highlands. "Fact" (August).

90. KEIR, D. 1951. Power from the Glens. "The Listener", 5/7/51.

91. KITTERIDGE, J. 1948. Forest Influences. McGraw Hill, London.

92. KNOX, J. 1787. A Tour through the Highlands of Scotland and the Hebride Isles in 1786. Walter, London.

93. KYD, J.G. 1952. Scottish Population Statistics. Scot. Hist. Soc. 3rd Series, Vol. 43.

94. LAUDER, Sir T.D. 1873. An Account of the Great Floods of August, 1829, in the Province of Moray and the adjoining District. Black, Edinburgh.

95. LAWRIE, T. 1952. The Schemes of the North of Scotland Hydro-Electric Board. Trans. Royal Inst. Chart. Survrs., Vol. 85, Part, 3.

96. LEES, J.C. 1897. Inverness. County Histories Series of Scotland. Blackwood, Edinburgh and London.

97. LEIGH, M.M. 1928-29. The Crofting Problem. Scot. Jour. Agric. Vols. 11 - 12.

98. LINTON, D.L. 1940. The Evolution of the Drainage Systems of the Tay and Earn. S.G.M. Vol. 56.

99. LINTON, D.L. 1951. Problems of Scottish Scenery. S.G.M. Vol. 67.

100. LINTON, D.L. 1951. Some Scottish River Captures Re-examined. S.G.M. Vol. 67.

101. MACCOLL, Sir E. 1946. Hydro-Electric Development in Scotland. Royal Phil. Soc. Glasgow.

102. MACCOLL, Sir E. 1950. Hydro-Electric Developments in the Scottish Highlands. Fourth World Power Conference, in London, Scot. H.l., Paper 10.

103. MACCOLL, Sir E. 1952. Hydro-Electric Developments in Scotland. Proc. Inst. Elect. Engrs., Vol. 99, Pt. 1, No. 116. (March).

104. McCREATH, J.B. & MURRAY, R.D. 1955. A Survey of an Argyll Hill Farm District. West of Scot. Agric. Coll., Econ. Dept.

105. MACDONALD, C.M. 1955. Guide to the County of Argyll. Simmath Press Ltd., Simmath House, Dundee.

106. MACDONALD, D.F. 1937. Scotland's Shifting Population, 1770-1850. Jackson, Glasgow.

107. MACDONALD, J. 1811. General View of the Agriculture of the Hebrides or Western Isles of Scotland. Prepared for Consideration by the Board of Agriculture and Internal Improvement, Edinburgh.

108. MACDONALD, J. & CLARK, D. 1881. On the Comparative Advantages of Grazing Cattle and Sheep together or separately on Permanent Pastures. Trans. Highland and Agric. Soc., Vol. 1.

109. MACDONALD, J.A.B. 1945. The Lon Mhor: Twenty years research into Wasteland Peat Afforestation in Scotland. Forestry, Vol. 19.

110. MACDONALD, J.A.B. 1958. The Integration of Forestry and the Hill Sheep Farm. Paper read to the Forestry Sect., Brit. Assoc., Glasgow.

111. MACDONALD, Sir M. & KAY, J.M. 1953. Electricity in the North of Scotland. Scot. Jour. Pol. Econ., Vol. 4.

112. MACDONALD, W. 1872. On the Agriculture of Inverness-shire. Trans. Highland Soc., 2nd Series, Vol. 4.

113. MACKENZIE, A. 1883. The History of the Highland Clearances. MacLaren, Glasgow.

114. MACKENZIE, A. 1891. The History of the Chisholms. MacKenzie, Inverness.

115. MACKENZIE, A. 1896. The History of the Frasers of Lovat. MacKenzie, Inverness.

116. MACKENZIE, O.H. 1918. A Hundred Years in the Highlands (Pop.Ed.). Arnold, London.

117. MACKENZIE, W.C.1906. A Short History of the Scottish Highlands and Islands. Paisley.

118. McLAUGHLAN, T. 1849. The Depopulation System in the Highlands. Edinburgh.

119. MACLEAN, D. 1950. The Effect of the 1745 Rising on the Social and Economic Conditions of the Highlands. Edinburgh.

120. MACLELLAN, W. 1945. Highland Power. Scot. Area Comm., Assoc. Scient. Workers, Glasgow.

121. MACNAIR, P. 1912. Perthshire. Cambridge County Geographies. C.U.P.

122. MAIS, S.P.B. 1947. I return to Scotland. Johnson, London.

123. McNEILL, Sir J. 1851. Report to the Board of Supervision on the Western Highlands and Islands. Edinburgh.

124. MACPHERSON, A. 1959. Land Use Problems in the Hill Areas of Scotland. Geog. Essays in Memory of Alan G. Ogilvie. Nelson, Edinburgh.

125. MARSHALL, W. 1794. General View of the Agriculture in the Central Highlands of Scotland with Observations on the Means of their Improvement. Prepared for Consideration by the Board of Agriculture and Internal Improvement, Edinburgh.

126. MATHIESON, J. 1938. The Tragedy of the Scottish Highlands. S.G.M. Vol. 54.

127. MATTHEWS, J.E. 1939. The Ecological Approach to Land Utilisation. Scot. Forestry Jour. Vol. 53.

128. MATTHEWS, J.E. 1937. Geographical Relationships of the British Flora. Jour. Ecol. Vol. 25.

129. MITCHELL, Sir A. 1907. Notes and Observations of divers parts of the High-:lands and Isles of Scotland. Vol. 2., Edinburgh.

130. MITCHISON, N. 1946. Exodus from the Highlands. S.M.T. Mag. Vol. 42.

131. MONCRIEFF-SCOTT, G. 1945. Electricity in its Regional Setting. Highland Heritage, Essay No. 13. Arch. Rev., Architectural Press, Cheam, Surrey.

132. MORRISON, W.H. 1939. Aluminium and Highland Water Power. Jour. Inst. Metals, Vol. 65.

133. MUNBY, D.L. 1954. Transport Costs in the North of Scotland. Scot. Jour. Pol. Econ. Vol. 1, No. 1.

134. MUNBY, D.L. 1956. Electricity in the North of Scotland. Scot. Jour. Pol. Econ. Vol. 3, No. 1.

135. MURRAY, Sir J. & PULLAR, L. 1902-06. Bathymetric Surveys of the Fresh-Water Lochs of Scotland. S.G.M. Vols. 18, 19 and 22.

136. MURRAY, J.M. 1935. An Outline of the History of Forestry in Scotland up to the end of the 19th Century. Scot. Forest.Jour., Vol. 49, No. 1.

137. NAIRNE, D. 1891. Notes on Highland Woods Ancient and Modern. Trans. Gael. Soc., Inverness, Vol. 17.

138. NAIRNE, D. 1895. Memorable Floods of the 19th Century. Northern Counties Printing and Publishing Co. Ltd., Inverness.

139. NEWLANDS, A. 1908. Water Power in the Highlands. Trans. Inverness Scient. Soc. and Field Club, Vol. 7.

140. NEWLANDS, A. 1911. Utilisation of Sources of Energy. Trans. Inverness Scient. Soc. and Field Club, Vol. 7.

141. NIVEN, W.N. 1902. On the Distribution of certain Forest Trees in Scotland as shown by the Investigation of Post-Glacial Deposits. S.G.M. Vol. 17.

142. NOBLE, T.A.F. 1951. The Economic Development of the Highlands. The Manchester School. Vol. 19.

143. NOBLE, T.A.F. 1954. The Future of Crofting. Scot. Journ. Pol. Econ. Vol. 1.

144. O'DELL, A. 1932. The Population of Scotland, 1755-1931. S.G.M. Vol. 48.

145. OGG, W.G. 1927. Scottish Soils in Relation to Climate and Vegetation. Proc. First Internat. Congr. of Soil Science, Washington.

146. OGILVIE, A.G. 1922. The Physiography of the Moray Firth Coast. Trans. Royal Soc. Edin. Vol. 53, Pt. 2.

147. OGILVIE, A.G. (Ed.) 1928. The Highlands and Hebrides. Gt. Britain: Essays in Regional Geography. C.U.P.

148. OSBORNE, R.H. 1956. Scottish Migration Statistics - a note. S.G.M. Vol. 72.

149. OSBORNE, R.H. 1958. The Movements of People in Scotland. Scot. Studies, Vol. 2, Pt. 1.

150. PAYNE, G. 1950. The Tay Valley Regional Plan. East Central (Scotland) Reg. Planning Advisory Comm., Dundee.

151. PEARSALL, W.H. 1950. Mountains and Moorlands. Collins, London.

152. PHEMISTER, J. 1948. Scotland - The Northern Highlands. Brit. Reg. Geol., H.M.S.O., Edinburgh.

153. PREBBLE, J. 1961. Culloden. Secker & Warburg, London.

154. RAE, G. & BROWN, C.E. 1959. A Geography of Scotland. Bell, London.

155. READ, H.H. 1948. Scotland - The Grampian Highlands. Brit. Reg. Geol., H.M.S.O., Edinburgh.

156. REID, F.C. 1950. Beyond the Great Glen. Oliver & Boyd, London.

157. RITCHIE, J. 1919. Some Effects of Sheep Rearing on the Natural Conditions of Scotland. Scot. Jour. Agric., Vol. 2, No. 2.

158. RITCHIE, J. 1920. The Influence of Man on Animal Life in Scotland. C.U.P.

159. ROBERTSON, J. 1799. General View of the Agriculture of Perthshire (2nd Ed.). Morison, Perth.

160. ROBERTSON, J. 1813. General View of the Agriculture of Inverness. Morison, Perth.

161. ROSS, W.C.A. 1934. Highland Emigration. S.G.M. Vol. 50.

162. RUSSELL, W. 1953. Passing Glances. Aberdeen "Press and Journal", 10/6/53.

163. SALAMAN, R.N. 1949. The History and Social Influence of the Potato. C.U.P.

164. SINCLAIR, J. 1795. General View of the Agriculture of the Northern Counties of Scotland. Prepared for Consideration by the Board of Agriculture and Internal Improvement, Edinburgh.

165. SMITH, J. 1805. General View of the Agriculture of Argyll. Prepared for Consideration by the Board of Agriculture and Internal Improvement, Edinburgh.

166. SMITH, R. 1900. On the Seed Dispersal of Pinus Sylvestris and Betula Alba. Annals of Scottish Natural History. Vol. 9.

167. SMITH, R. 1900. Botanical Survey of Scotland, 2 - North Perthshire District. S.G.M. Vol. 16.

168. SMITH, W.G. 1902. Heather Moorlands. S.G.M. Vol. 18.

169. SNODGRASS, C.P. 1933. Stock Farming in Relation to Environment. S.G.M. Vols. 49 and 50.

170. SNODGRASS, C.P. 1943. Map of Economic Regions of Scotland. S.G.M. Vol. 59.

171. SNODGRASS, C.P. 1944. Recent Population Changes in Scotland. S.G.M. Vol. 60.

172. SPAVEN, F.D.N. 1954. Decline and Stability in Highland Areas. Planning Outlook 3(2), King's College, University of Durham.

173. STAMP, L.D. (ed.) 1944. The Highlands of Scotland, Parts 9-12. Report of the Land Utilisation Survey of Britain, Geographical Publications, London.

174. STAPLETON, R.G. 1936. The Improvement of Hill Land. Scot. Jour. Agric. Vol. 19.

175. STAPLETON, R.G. 1937. The Hill Lands of Britain. Faber & Faber, London.

176. STAPLETON, R.G. 1938. The Stock Carrying Capacity of Hill Grazings. Scot. Jour. of Agric. Vol. 21.

177. STEBBING, E.P. 1938. The Forestry Question in Great Britain. London.

178. STEVEN, H. 1951. The Forests and Forestry of Scotland. S.G.M. Vol. 67.

179. STEWART, A. 1928. A Highland Parish or the History of Fortingall. MacLaren, Glasgow.

180. STUART, J.S. & C.E. 1848. Lays of the Deer Forest, Vol. 2. Blackwood, Edinburgh.

181. SYMONS, L. 1959. The Economic Conquest of the Hills. S.G.M. Vol. 75.

182. TAMM, O. 1950. Northern Coniferous Forest Soils. O.U.P.

183. TANSLEY, A.G. 1939. The British Islands and their Vegetation. C.U.P.

184. TANSLEY, A.G. 1949. Britain's Green Mantle. Allen & Unwin, London.

185. TARR, R.S. 1908. Glacial Erosion in the Scottish Highlands. S.G.M. Vol. 24.

186. VINCE, S.W.E. 1952. Reflections on the Structure and Distribution of Rural Population in England and Wales, 1921-31. Trans. and Papers, Inst. Brit. Geog. Vol. 18.

187. WALLACE, R. 1917. Heather and Moor Burning for Grouse and Sheep. Oliver & Boyd, Edinburgh.

188. WALLACE, T.D. 1885. Basin of the Beauly. S.G.M. Vol. 1.

189. WALLACE, T.D. 1895. Notes on the Geology of Kiltarlity. Trans. Inverness Scient. Soc. and Field Club, Vol. 4.

190. WATSON, J.A.S. 1929. The Agricultural Revolution in Scotland. Trans. Highland and Agric. Soc., Vol. 41.

191. WATSON, J.A.S. 1932. The Rise and Development of the Sheep Industry in the Highlands and North of Scotland. Trans. Highland and Agric. Soc., Vol. 44.

192. WATSON, J.W. 1939. Forest or Bog, Man the Deciding Factor. S.G.M. Vol. 55.

193. WATT, H.B. 1908. The Tree Limit in the Scottish Highlands. S.G.M. Vol. 24.

194. WHAYMAN, A. 1951. Natural Regeneration of Old Scots Pine at Rannoch. Jour. F.C. Vol. 20.

195. WHITEHEAD, G.K. 1960. The Deer Stalking Grounds of Great Britain and Ireland. Hollis & Carter, London.

Abbreviation: S.G.M. - Scottish Geographical Magazine.

GOVERNMENT AND OTHER REPORTS (Chronologically Arranged)

<u>Agriculture</u>

196. 1884. Report of the Commission of Inquiry into the Conditions of Crofters and Cottars in the Highlands and Islands of Scotland with Evidence and Appendices (Napier Commission). C.3980, Vols. 32-34.

197. 1933. Report of the Committee on the Sheep Farming Industry. Scot. Nat. Dev. Council, Glasgow.

198. 1944. Report of the Committee on Hill Sheep Farming in Scotland. Cmd. 6494, Vol. 3.

199. 1947. Report on Scotland's Marginal Farms. Dept. of Agric. for Scotland.

200. 1953-54. Report of the Commission of Inquiry into Crofting Conditions. Cmd. 9091, Vol. 8.

201. 1954-61. First and Second Reports of the Hill Farming Research Organisation.

202. 1956. Report of the Hill Lands (North of Scotland) Commission. Cmd. 9759, Vol. 10.

Forestry

203. 1885-87. Report of the Select Committee on Forestry. Parliamentary Report, M.S., Vol. 8.

204. 1902. Report of the Departmental Committee on Scottish Forestry. Cd. 1319, Vol. 20.

205. 1908. Report of the Royal Commission on Coast Erosion and Afforestation. Cd. 4461, Vol. 14.

206. 1911. Report on Afforestation in Scotland. Royal Scot. Abor. Soc.

207. 1912-13. Report of the Departmental Committee on Forestry in Scotland. Cd. 6085, Vol. 29.

208. 1917-18. Report of the Reconstruction Committee, Forestry Sub-Committee (Acland Committee). Cd. 8881, Vol. 18.

209. 1919-61. Annual Reports of the Forestry Commission, Nos. 1-41.

210. 1922. Report of the Committee on National Expenditure (Geddes Committee). Cmd. 1581, Vol. 9.

211. 1942-43. Report on Post-War Forest Policy. Cmd. 6447, Vol. 4.

212. 1943-44. Report on Post-War Forest Policy (Private Woodlands). Cmd. 6500, Vol. 3.

213. 1950. The Dedication of Woodlands. F.C. Booklet No. 2 (2nd Ed.), H.M.S.O. Edinburgh.

214. 1955-56. Report of the Welsh Agricultural Land Sub-Commission on Mid-Wales. Cmd. 9631, Vol. 10.

215. 1955. Report of the Committee on Hedgerow and Farm Timber. F.C. Report.

216. 1956. Report on the Marketing of Woodland Produce. (Watson Report). F.C. Report.

217. 1957. Shelter Belts and Micro-climate. F.C. Bull. No. 29.

218. 1959. Small Pulp Mill Survey. F.C. Booklet. H.M.S.O. Edinburgh.

219. 1959. Shelter Woods or Belts. Dept. of Agric. for Scot., Advisory Leaflet No. 5, H.M.S.O. Edinburgh.

220. 1919. Interim Report of the Water Power Resources Committee. Cmd. 79, Vol. 30.

221. 1936. Report of the Electricity Distribution Committee (McGowan Committee). Ministry of Transport.

222. 1938. Report of the Highlands and Islands Committee (Hilleary Committee). Scot. Econ. Committee.

223. 1942-43. Report of the Committee on Hydro-Electric Development in Scotland (Cooper Committee). Cmd. 6406, Vol. 4.

224. 1944-59. Constructional Schemes as submitted to the Secretary of State for Confirmation. North of Scotland Hydro-Electric Board.

1944. Constructional Scheme: No.1. Sloy, Morar and Loch Alsh.
1944. Constructional Scheme: No. 2. Tummel-Garry.
1946. Constructional Scheme: No. 7. Affric-Mullardoch-Fasnakyle.
1947. Constructional Scheme: No. 4. Cowal (Tarsan).
1947. Constructional Scheme: No.12. Glen Shira.
1948. Constructional Scheme: No. 9. Tummel-Garry Transmission Lines.
1949. Constructional Scheme: No.27. Allt na Lairige.
1949. Constructional Scheme: No.14. Fasnakyle-Beauly Transmission Lines.
1949. Constructional Scheme: No.15. Gaur.
1952. Constructional Scheme: No.61. Kilmelfort.
1953. Constructional Scheme: No.69. Cowal (Tarsan) Extension.
1955. Constructional Scheme: No.71. Glashan.
1955. Constructional Scheme: No.31. Tummel Valley Additions.
1957. Constructional Scheme: No.30. Strathfarrar-Kilmorack.
1959. Constructional Scheme: No.28. Awe (Nant Section).

225. 1944-59. Constructional Schemes - Explanatory Memoranda. North of Scotland Hydro-Electric Board. H.M.S.O. Edinburgh.

1944. Constructional Scheme: No. 1. Cmd. 6596.
1944. Constructional Scheme: No. 2. Cmd. 6660.
1946. Constructional Scheme: No. 7. Cmd. 6967.
1947. Constructional Scheme: No. 4. Cmd. 7040.
1947. Constructional Scheme: No.12. Cmd. 7180.
1948. Constructional Scheme: No. 9. Cmd. 7378.
1949. Constructional Scheme: No.27. Cmd. 7618.
1949. Constructional Scheme: No.14. Cmd. 7641.
1949. Constructional Scheme: No.15. Cmd. 7683.
1952. Constructional Scheme: No.61. Cmd. 8693.
1953. Constructional Scheme: No.69. Cmd. 8756.
1955. Constructional Scheme: No.71. Cmd. 9456.
1955. Constructional Scheme: No.31. Cmd. 9563.
1957. Constructional Scheme: No. 30. Cmnd.408.
1959. Constructional Scheme: No.28. Cmnd.681.

226. 1946-61. Annual Reports of the North of Scotland Hydro-Electric Board, Nos. 1-16.

227. 1957. The Passage of Smolts and Kelts through Fish Passes. A Report prepared by the Salmon Research Committee Pass Investigation Sub-Committee, Scot. Home Department.

Population

228. 1755. WEBSTER, Rev. A. An Account of the Number of People in Scotland in the year, One-Thousand, Seven Hundred and Fifty-five (in manuscript), National Library of Scotland, Edinburgh.

229. 1791. The First Statistical Account of Scotland. Creed, Edinburgh.

230. 1845. The Second Statistical Account of Scotland. Laing, Edinburgh.

231. 1801-51. Accounts of the Census of Great Britain.

232. 1861-1951. Reports on the Census of Scotland.

233. 1945-1960. Parish Parliamentary Electoral Rolls. The Registrar General for Scotland, Edinburgh.

234. 1951-60. Annual Estimates of the Population of Scotland. The Registrar General for Scotland. H.M.S.O., Edinburgh.

235. 1958. SUTHERLAND, D.J.S. & ROBERTSON, C. The Third Historical and Statistical Account of Pitlochry and the Parish of Moulin. Pitlochry Town Council Publication. County Report as yet unpublished.

236. 1959. DILKE, M.S. & TEMPLETON, A.A. (eds.). The County of Dunbarton, Vol. 6. The Third Statistical Account of Scotland. Collins, Glasgow.

237. 1961. MACDONALD, C.M. (ed.). The County of Argyll, Vol. 9. The Third Statistical Account of Scotland. Collins, Glasgow.

238. 1961. Preliminary Report on the Census of Scotland.

Miscellaneous

239. 1802-03. The Report of the Coast of Scotland and Naval Enquiry. Edinburgh.

240. 1909. Forfeited Estates' Papers, 1715-45. Vol. 57. Scot. Hist. Soc.

241. 1919. The Book of Normals of Meteorological Elements of the British Isles. Met. Office.

242. 1919. Report of the Departmental Committee on Deer Forests. Cmd. 1636, Vol. 7.

243. 1948. Report on National Parks and the Conservation of Nature in Scotland. Cmd. 7235, Vol. 14.

244. 1950. Report on Industry and Employment (Scotland) Cmd. 7937, Vol. 19.

245. 1950. A Programme of Highland Development. Cmd. 7976, Vol. 19.

246. 1952. Climatological Atlas of the British Isles. Met. Office.

247. 1955. Annual Report of the Nature Conservancy. No. 25.

248. 1957. Forestry, Agriculture and Marginal Land: A Report by the Natural Resources (Technical) Committee. (Zuckermann Committee). D.S.I.R.

249. 1957. The Surface Water Year Book of Great Britain. Surface Water Survey Centre, Ministry of Housing and Local Govt., London.

250. 1958-59. Review of Highland Policy. Cmnd. 785, Vol. 25.

251. 1959. Highland Opportunities. H.M.S.O. Edinburgh.